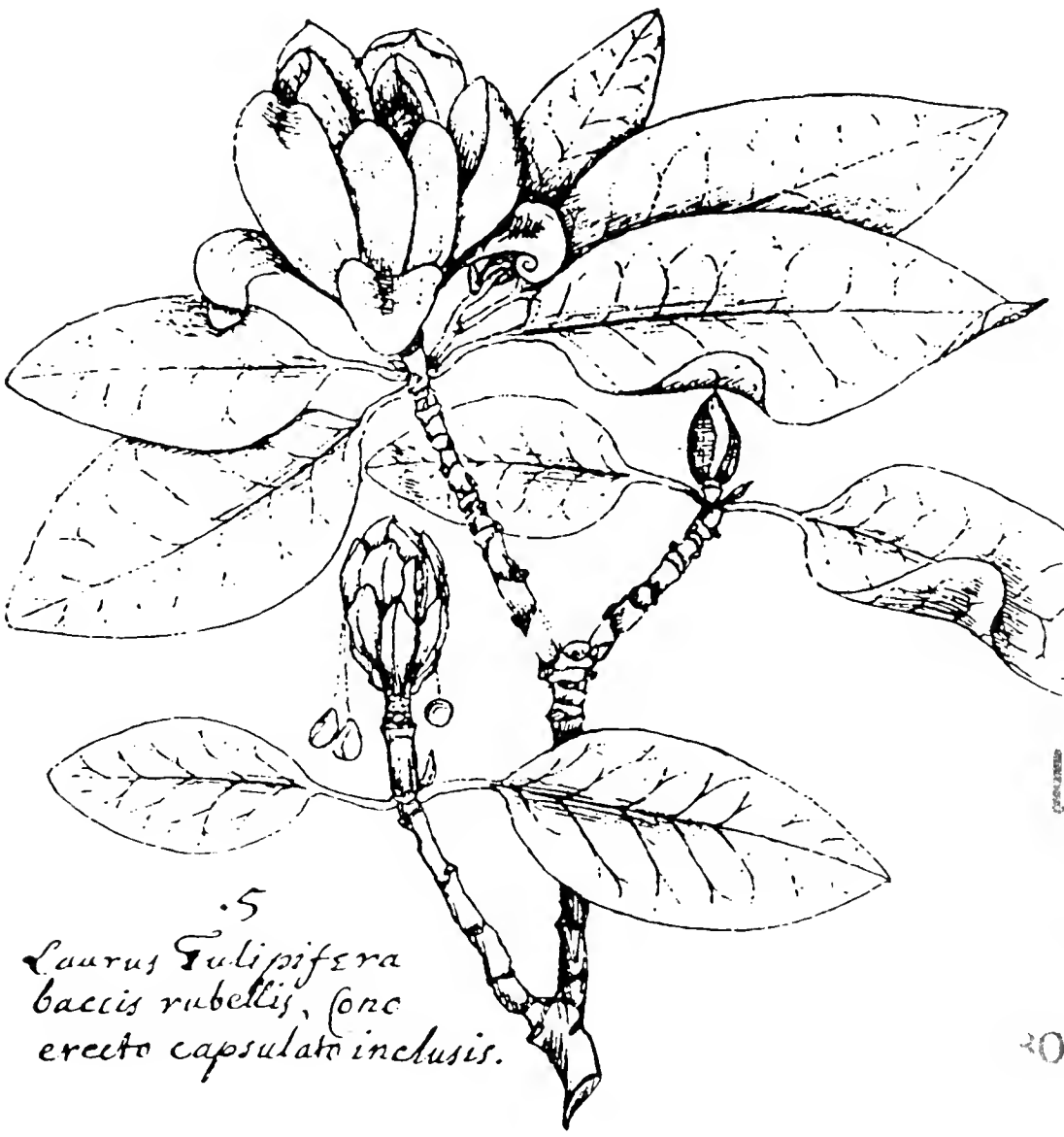
BANISTERIA

A JOURNAL DEVOTED TO THE NATURAL HISTORY OF VIRGINIA



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Ground Beetles (Coleoptera: Carabidae) from Quantico Marine Corps Base, Virginia

John M. Anderson[1], Joseph C. Mitchell[2], Adrienne A. Hall[2], Richard L. Hoffman[1]

[1]Virginia Museum of Natural History,
Martinsville, Virginia 24112

[2]Department of Biology,
University of Richmond,
Richmond, Virginia 23173

Ground beetles (carabids) comprise a dominant element in the terrestrial insect fauna in many parts of the world. Diverse in species, abundant in individual numbers, and adapted to a wide variety of biotopes, these beetles provide a valuable resource for studies in ecology, distribution, and evolutionary processes.

With approximately 453 species of carabids now recorded (Davidson, 1995), this family holds first place in a numerical ranking of Virginia's beetle groups. A large number of the species are, however, known from only one or two localities, and existing information on both geographic and seasonal occurrence is strikingly deficient.

A study of the terrestrial animals of the Marine Corps Combat Development Command, Quantico, Virginia was conducted by the second author during the fall of 1990 and spring of 1991. Although intended to survey the local fauna of amphibians and reptiles, the pitfall sampling techniques employed obtained large numbers of epigaean arthropods, including just over 3000 carabids. Drift fence/pitfall installations have proven to be effective methods for sampling terrestrial animals (Gibbons & Semlitsch, 1981; Mitchell et al., 1993). Such studies, even when conducted for relatively short periods of time can yield considerable information on the composition and structure of ground beetle communities. Comparison of the carabid faunas in other locations and habitats in Virginia might be best made by using such collecting technique, granting their apparent limitation in capturing arboreal and streamside species. Quantitative analyses of these samples, with reference to the three different biotopes surveyed are currently being prepared for publication. The present paper provides a baseline checklist of the 78 species of ground beetles collected, with emphasis on overall and local distribution.

Since no locality in the Commonwealth has yet been thoroughly inventoried with respect to carabids, it is difficult to relate the Quantico fauna to that in other parts of the state. Two studies have been conducted during predatory insect inventories in crop fields (soy beans, alfalfa), one of them in Rockbridge County (Los & Allen, 1983), the other in Westmoreland County (Ferguson & McPherson, 1985). Although both investigations utilized a pitfall (can trap) technique, they sampled the beetles of a biotope which, if not atypical for carabids, is not directly comparable to the chiefly woodland habitats surveyed at Quantico.

Another useful reference point, virtually in Virginia, is Plummers Island in the Potomac River, just upstream from Washington, DC, and about 50 km north of Quantico and in a comparable physiographic position. Although technically in Montgomery Co., Maryland, Plummers Island is only 100 m across the river from the Langley area of Fairfax Co., Virginia. A detailed analysis of the Plummers Island carabids examined that fauna from numerous faunistic, historical, and ecological perspectives, and provided a basis for comparison with that at Quantico. Although 214 species of ground beetles have been found on Plummers Island, it must be emphasized that this figure (three times the Quantico total) was achieved over an 80-year period by skilled beetle collectors examining every available microhabitat throughout the year. Furthermore, many of the species

were found only once (suggesting random flight dispersal or downstream transport by high water), and during the last decade included in Erwin's survey (1970-79), only 101 species were taken. The majority of the Plummer's Island fauna not found at Quantico are small riparian and/or edaphobic obligates unlikely to be taken in pitfalls. Despite the deficiency resulting from this bias, the Quantico total of 78 carabids does not suffer from comparison with the 101 found in recent years at Plummers Island, when the relatively short sampling period is taken into account. Because of its geographic proximity to Quantico, and physiographic Coastal Plain, and 82 km to the southeast similarity (both localities straddle the Fall Line), we selected the fauna of Plummers Island as a primary basis for comparison, rather than the nearest Virginia site mentioned above (Westmoreland County, strictly).

Description of the Area and Biotopes

Occupying a substantial part of Stafford and a relatively small part of Prince William counties, Quantico Marine Corps base is astride the "Fall Line," with the easternmost extent along the Potomac River estuary and therefore in the Coastal Plain physiographic province. The majority of the reservation (west of US I-95) is located in the Piedmont. Sampling was conducted in three primary habitat types (each replicated with two sites): floodplain hardwoods (sites 1 and 5), upland hardwoods (site 4 and 6), and old fields (sites 2 and 3), the sites located along a roughly east-west transect in the Chopawamsic Creek drainage (Fig. 1). Site 1 was located in Prince William County just east of US I-95, sites 2-6 west of this highway in Stafford County.

Floodplain hardwoods were characterized by seasonally saturated soil, canopy trees dominated by tulip poplar (*Liriodendron tulipifera*), sweet gum (*Liquidambar styraciflua*), and red maple (*Acer rubrum*), and an understory of American holly (*Ilex opaca*) and red maple. Upland hardwoods were located on dry soils and consisted of red oak (*Quercus rubra*), white oak (*Quercus alba*), and tulip poplar, with an understory of dogwood (*Cornus florida*) and American holly. Old field soils were dry and supported mostly herbaceous plants dominated by a mixture of grasses and shrubs (e.g., *Lespedeza*, *Vaccinium*) and planted loblolly pine (*Pinus taeda*). Old field sites, of course, lacked a canopy.

Sampling was conducted with drift fence/pitfall arrays during two six-week periods (30 August - 11 October 1990 and 17 April - 29 May 1991). Each array consisted of three separate arms of aluminum flashing (0.66 x 7.5 m) and six 19-l plastic buckets for pitfalls. One array was constructed in each study site. Captures were removed from the arrays weekly during each of the sampling periods.

Annotated List of Species

We have followed the systematic sequence and nomenclature employed in the recent and comprehensive list of North American carabids by Bousquet & Larochelle (1993), which summarizes by state the known distribution of each species. Our statements about overall species ranges are drawn from this and other literature sources; references to in-state range are based largely on material in the VMNH collection.

One departure from the Bousquet-Larochelle list is the decision to disregard subspecific categories where they have been introduced prior to modern generic revision and often more varietal than geographic in basis.

A number of species credited to "VA" in the 1993 list are based on so-far unpublished records in VMNH. Some of these have recently been documented by Davidson (1995); several others are now substantiated from material taken at Quantico and elsewhere in the state.

Users of the present list are alerted to several changes of name affecting common and well-known local species: thus Carabus limbatus Say has become Carabus goryi Dejean, and Stenolophus carbonarius Say renamed Stenolophus carbo Bousquet (Bousquet & Larochelle, 1993).

Family Carabidae

Tribe Notiophilini

1. Notiophilus aeneus Herbst. Eight specimens were collected in spring in upland hardwoods (site 6) only. This beetle is widespread in northeastern United States, apparently reaching its southern limit in Georgia. It occurs in most parts of Virginia at low to moderate elevations, and Erwin (1981: 131) recorded several specimens from moist sites on Plummers Island.

2. *Notiophilus semistriatus* Say. Eight specimens were collected during the spring period only, from old field (2, 3), upland hardwoods (4) and floodplain hardwoods

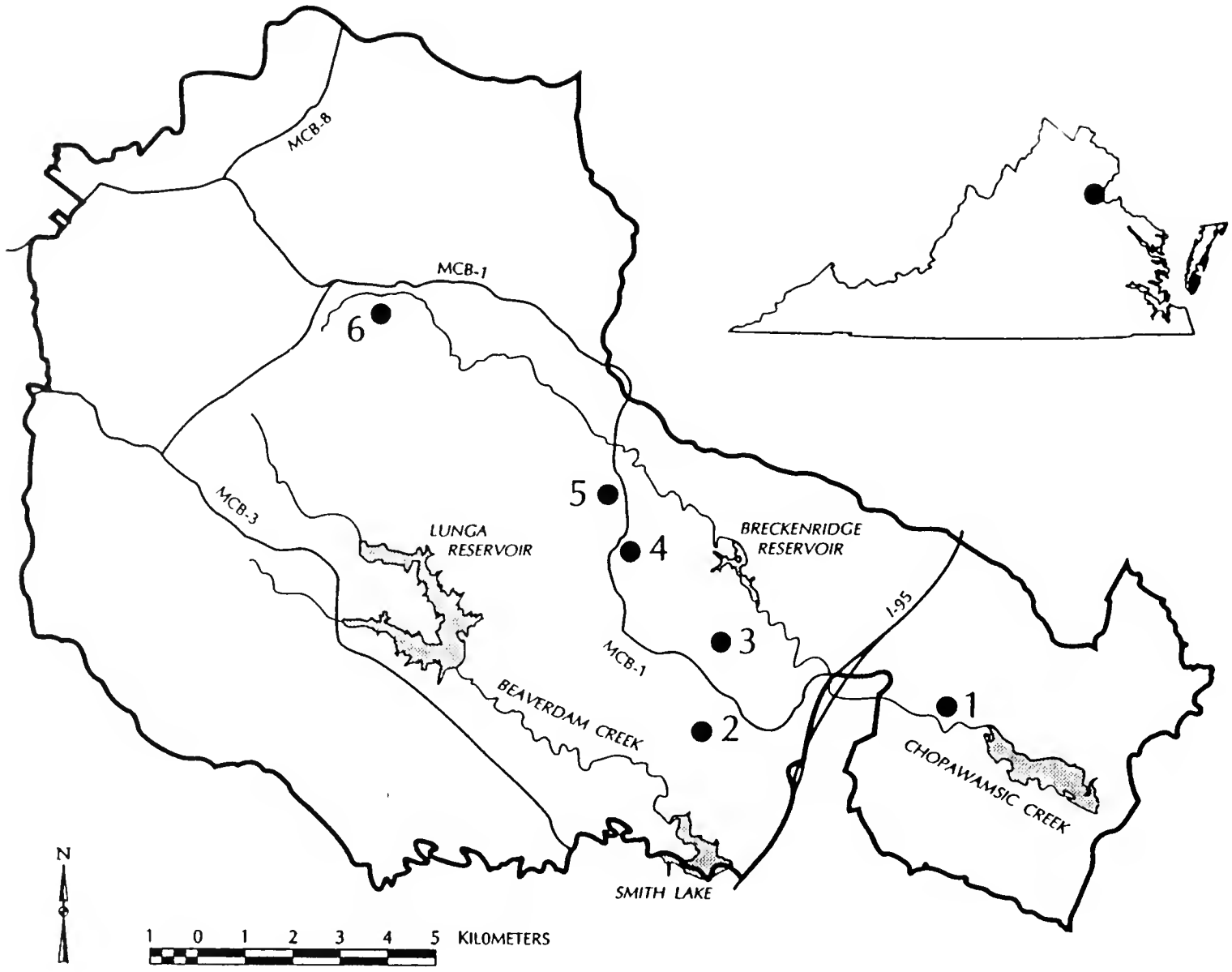

Figure 1. Location of the six drift fence/pitfall sampling sites on Quantico Marine Corps Base, Virginia.

(5) sites. The range of this species is similar to that of the preceding, although *N. semistriatus* extends further north and west. Only one specimen was found on Plummers Island (Erwin 1981: 132), and *semistriatus* is the least represented of the three Virginia notiophilids in the VMNH collection.

Tribe Cicindelini (formerly Cicindelidae)

3. *Cicindela sexguttata* Fabricius. We examined 62 specimens collected in the spring only, from all sites except 5, which is in floodplain hardwoods. Over half of the total came from old field site 3. This is typically a forest-dwelling species which invades open clearings, widespread over most of the United States and adjacent Canada. It is statewide in Virginia, and one of the most common tiger beetles in the region. Erwin (1981: 138) considered *sexguttata* to be common on Plummers Island throughout the 76 year period of his survey, and, consonant with our findings, recorded adults only in March, April, and May.

4. *Cicindela unipunctata* Fabricius. Two specimens were collected during the spring sampling period, from upland hardwoods at site 4. C. *unipunctata* occurs throughout most of the eastern United States, and is widespread in Virginia. A species of upland woods, it extends only slightly into the Coastal Plain along its western edge. It has not been collected on Plummers Island.

Tribe Carabini

5. *Calosoma wilcoxi* LeConte. Three specimens were taken during the spring period, in upland hardwoods at site 6 only. The species occurs in most of the United

States and in Quebec. Most Virginia records are in the Coastal Plain and Piedmont provinces, but a few records exists for several mountain counties. It was not recorded by Erwin (1981) for Plummers Island.

6. *Carabus goryi* Dejean. A total of 66 specimens was captured, the great majority (59) of them in upland hardwoods at site 6, and all but two of them during the spring sampling period. The species occurs almost everywhere east of the Mississippi River, and is one of the most abundant carabids in Virginia, where it is statewide. Under the earlier name *limbatus*, Erwin (1981: 133) noted that "many examples" were collected at Plummers Island between 1905 and 1920, but none since the latter date.

7. *Carabus vinctus* Weber. The majority of the 170 specimens from Quantico were trapped in floodplain hardwoods at sites 1 and 5, and about two-thirds of them during the spring period. Although the species is essentially statewide in Virginia, most of the records are for the Coastal Plain province, reflecting a generally southern range over eastern United States. Despite the abundance of this species at Quantico, Erwin (1981: 134) found only a few records for Plummers Island, none of them since 1914.

8. *Carabus serratus* Say. Three specimens of this very distinctive species were collected in spring from upland hardwoods (sites 4 and 6). *C. serratus* is manifestly a boreal species, extending across northern North America, and southward through the Appalachians to South Carolina. Previous Virginia records have been on and west of the Blue Ridge at elevations above 300 m, except for several old specimens in the USNM collection labeled "Alexandria" and "Glencarlyn." Erwin (1981: 134) cited single captures for Plummers Island in 1923 and the "Virginia shore" in 1912, both of which could represent specimens rafted down the Potomac during high water from some upland origin. But the Quantico material implies an existing disjunct population in northern Virginia, some 35 mi/60 km east of the nearest populations on the Blue Ridge.

9. *Carabus sylvosus* Say. Of the 28 specimens of this species captured at Quantico, 27 were trapped during the spring period at sites 4, 5, and 6. The single exception was collected at the old field site 3 in fall. *C. sylvosus* occurs over most of eastern North America, as far west as Texas and Kansas. Most Virginia records are for the Coastal Plain and Piedmont, with a few disjunct finds for the Blue Ridge (at 1000 m) and westward. Erwin (1981: 134) noted the capture of but a single beetle on Plummers Island, in 1922, although a few were taken on the Virginia side of the Potomac in 1905, 1920; and 1921, all September-November in contrast to the situation at Quantico.

Tribe Cychrini

10. *Sphaeroderus stenostomus* (Weber). Only nine specimens of this generally very abundant beetle were taken at Quantico, all during the spring period at sites 1, 2, 5, and 6. Specimens were taken from March through October at Plummers Island; and pitfall trapping elsewhere in Virginia by VMNH staff suggests that *stenostomus* is active throughout the year. The species (in the broad sense) occurs in Canada west to Saskatchewan and most of the eastern half of the United States. It is statewide in Virginia, where represented by several distinctive geographic races. Pending a revision of the genus by Prof. T. C. Barr, we decline to adopt existing trinomials (although it seems likely that the form in eastern Virginia will become the nominate subspecies).

11. *Scaphinotus elevatus* (Fabricius). A single specimen was captured at upland hardwoods site 6 during the spring period. *S. elevatus* appears to be scarce in Virginia, and Erwin (1981) cited no records for Plummers Island. This snail-eating beetle occupies a chiefly lowland range from Maine to Louisiana. Toward the south, the species does extend up into the Appalachians, and a few specimens have been taken west of the Blue Ridge in Virginia, at 650 m in Montgomery Co. Otherwise existing Virginia localities are all in the Piedmont and Coastal Plain.

12. *Scaphinotus unicolor* (Fabricius). This striking big species is among the most abundant ground beetles found at Quantico, where 66 specimens were taken (59 of them during the spring period) at all sites except floodplain hardwoods site 1. In an inclusive sense (ignoring the several dubious "subspecies" names), *unicolor* has a chiefly southern range, with most Virginia records confined to the Coastal Plain and Piedmont. Erwin cited "many specimens" taken on Plummers Island between 1902 and 1943, and it is difficult to imagine such a conspicuous beetle being overlooked during the following three decades by skillful carabid collectors.

Tribe Scaritini

13. *Scarites subterraneus* Fabricius. The 14 specimens from Quantico were all captured during the spring sampling period, at sites 1, 2, 3, and 6. The species seems to prefer dry habitats, and is common in urbanized areas around Virginia. Erwin (1981: 139) recorded captures at Plummers Island between 1902 and 1962. The lack of more recent collections is inexplicable, considering the usual abundance of this species over both a continent-wide range and statewide occurrence in Virginia.

14. *Clivina bipustulata* (Fabricius). All four specimens obtained during this study were taken during the spring: one from floodplain hardwoods (site 1), and three from old field (site 2). The latter seems atypical for this species, which is usually found closely associated with water. The range of the species includes most of eastern United States and Ontario; in Virginia existing locality records are restricted to the Coastal Plain and lower Piedmont. Erwin (1981: 141) mentioned "several specimens" from Plummers Island, from April through September.

Tribe Patrobini

15. *Patrobus longicornis* (Say). Only one specimen was trapped at the Quantico reservation, from the old field site 2 during the fall period. *P. longicornis* is frequently found associated with water, although it is not truly hygrophilous. On Plummers Island, "several specimens" have been taken by numerous collectors from April to November. The species is widely distributed across most of North America, and Virginia localities -although not numerous - are dispersed over most of the state.

Tribe Loxandrini

16. *Loxandrus brevicollis* (LeConte) Two specimens of this iridescent beetle were collected during the spring period from floodplain hardwoods (site 1) only. Like most members of the genus, *brevicollis* is partial to low wet situations, and its range is largely confined to the Coastal Plain from eastern Pennsylvania to Oklahoma. These specimens (kindly identified for us by R. L. Davidson). constitute a new state record for the species, which was not listed for Virginia by Bousquet & Larochelle (1993: 161), nor recorded from Plummers Island by Erwin (1981).

17. *Loxandrus inferus* Allen. Three specimens (R. L. Davidson, det.) of this recently described species were taken during the spring at floodplain hardwoods site 1. Previously known from Maryland (although not from Plummers Island), District of Columbia, Virginia, Georgia, Alabama, and Louisiana, *inferus* is represented in the VMNH collection from Greensville and Middlesex counties in the Coastal Plain, the City of Richmond on the Fall Line, and Halifax County in the southcentral Piedmont.

18. *Loxandrus* sp. indet. Twenty specimens of what appears to be a third member of the genus at Quantico were taken at site 1 during the spring period. The near impossibility of identifying females in this genus, as well as the difficulty of examining the internal aedeagal sac of formalin-preserved males, will require the collection of fresh material before an identification can be made.

Tribe Pterostichini

19. *Poecilus lucublandus* (Say). This generally abundant species is represented by 152 specimens taken during both the fall and spring intervals. The great majority (145) came from floodplain hardwoods sites 1 and 5; the other seven were trapped at old field site 2 and upland hardwoods site 6. *P. lucublandus* occurs in a variety of habitats including cultivated fields; Erwin (1981: 161) indicated that most of the captures on Plummers Island were from floodplain habitats. The species is continentwide in the United States and southern Canada, and statewide in Virginia.

20. *Lophoglossus* sp. indet. (possibly *substrenuus* LeConte). Five specimens were collected during the spring period in both floodplain (sites 1, 5) and upland hardwoods (site 6). In the current, unrevised condition of this genus, both the identities and ranges of the various species cannot be stated with any degree of certainty.

Several "morphospecies" occur in the Coastal Plain of Virginia; Erwin (1981) did not record the capture of any lophoglossid at Plummers Island.

21. *Myas coracinus* Say). Often very abundant locally, M. coracinus is represented in the Quantico material by 160 specimens taken in both the fall and spring intervals. They appeared in all sites, but half of the total number came from upland hardwoods site 6. Erwin (1981: 162) cites "many examples" taken on Plummers Island

between 1906 and 1919, with none found after the latter date (compare the similar case of *Scaphinotus unicolor*, above). The species is widespread in southern Canada, the Great Lakes region, and southward through the Atlantic coast states. In Virginia it is virtually statewide, but in the Coastal Plain only north of Richmond, and with Piedmont localities more toward its western perimeter.

22. *Pterostichus commutabilis* (Motschulsky). A single specimen of this scarce pterostichine was taken at site 1 during the spring season. The species occupies a farflung distribution across most of North America, but details about the southeastern part of the range are imprecise. The few existing records suggest a Coastal Plain extension as far as South Carolina; whether this segment is disjunct from the main part of the range in the northern interior is not clear.

The species was not cited for Virginia by Bousquet & Larochelle (1993: 168). The Quantico specimen and one in the VMNH collection from the Dismal Swamp, near Suffolk (19 May 1963, M. K. Klimkiewicz), provide the first known records for the state.

23. *Pterostichus coracinus* (Newman). Probably the most abundant carabid at Quantico, this species is represented by no fewer than 183 specimens, all but one of them taken in floodplain hardwoods sites 1 and 5. The one exception is from upland hardwoods at site 6. Most specimens were taken during the fall sampling period. The species occurs chiefly in northeastern North America, extending southward through the Appalachians, and is widespread in Virginia except for the Coastal Plain. Erwin (1981: 162) stated that *coracinus* was not found on Plummers Island (or the adjacent Virginia side of the Potomac) after 1919, although several specimens were collected prior to that date (see the analogous cases of *Scaphinotus unicolor* and *Myas coracinus*, mentioned above).

24. *Pterostichus caudicalis* (Say). One specimen from site 5, floodplain hardwoods, was taken in the fall sampling period. Several specimens were taken on Plummers Island and adjacent Maryland from 1908 through 1978 (Erwin, 1981: 163), and material is in the USNM collection from Langley, "Fairfax Co.", and "Alexandria". The species is known from most of Canada and northeastern United States, extending south through the Appalachians to North Carolina. Virginia records are very scanty and the Quantico individual is the only one in the VMNH collection.

25. *Pterostichus moestus* (Say). One specimen was taken in the spring period from floodplain hardwoods site 1. The range of this species embraces much of northeastern United States, west to Indiana and south to north Georgia. Most Virginia records are from the Blue Ridge and westward, although early records exist for Fredricksburg and the vicinity of Washington, DC. Erwin (1981: 163) cited specimens collected on Plummers Island prior to 1933. In North Carolina, *moestus* occurs only in the southern Blue Ridge.

26. *Pterostichus tristis* (Dejean). Nine specimens were collected at Quantico during the fall period, eight of them at upland hardwoods site 6, only one from floodplain hardwoods site 1. This species is primarily boreal, from Wisconsin, Ontario, and Nova Scotia south through the Appalachians to north Georgia. In Virginia, virtually all of the records are from the mountains and westernmost Piedmont, although VMNH has a series taken at Turkey Run Park, Fairfax County, just across the Potomac from Plummers Island. Erwin (1981: 161) recorded *tristis* from that site; these several records plus the Quantico material confirm the presence of this species in wooded sites well east of the Blue Ridge.

27. *Cyclotrachelus spoliatus* (Newman). With a total capture of 324 specimens, this species is the second most abundant carabid at Quantico. The great majority (86%) of this number were from old field site 3 (n=105) and from upland hardwoods site 4 (n=174). Most specimens were taken during the fall sampling period. The species ranges from the District of Columbia to Georgia, and in Virginia occurs exclusively on and east of the Fall Line. It is also very abundant in the nearby Prince William Forest Park (VMNH material), making its absence from Plummers Island the more remarkable. Apparently *spoliatus* prefers well-drained habitats despite its virtual restriction to the Coastal Plain.

28. *Cyclotrachelus furtivus* (LeConte). Four specimens (det. R. L. Davidson) were trapped at Quantico, all during the spring period, from site 1 (floodplain hardwoods) and site 4 (upland pine/hardwoods). The species occupies a curious range, from western Pennsylvania to New Jersey, and southward as far as the James River in Virginia (Freitag, 1969, Fig. 133). It has been collected in the District of Columbia as well as the

adjoining counties of Fairfax, Virginia, and Montgomery, Maryland, so its absence from Plummers Island is noteworthy.

29. *Cyclotrachelus sigillatus* (Say). We examined 62 specimens of *C. sigillatus*, taken in all Quantico sites except old field site 2. About two-thirds of the total were taken in the spring period. The species ranges from southern New York south and west to Alabama and the Florida panhandle (Freitag, 1969, Fig. 131). It is apparently statewide in Virginia.

Tribe Zabrini

30. *Amara pennsylvanica* Hayward. Five specimens were collecting in the fall from floodplain hardwoods (site 1) and old field (site 2) habitats. The species occurs in eastern Canada (to Nova Scotia) and southward through much of eastern United States except the coastal plain, the few records for Virginia (VMNH) and North Carolina (Brimley, 1938) are in the Piedmont and mountains, and those for South Carolina (Kirk, 1969) in the extreme westernmost corner. Erwin (1981) had no records for Plummers Island.

31. *Amara cupreolata* Putzeys. Six specimens of this species were taken in spring from old field sites (2 and 3) only, suggesting a dry (or disturbed) habitat preference. *A. cupreolata* is widespread over much of North America east of the Rockies but it seems to be spotty in occurrence (collector bias?). VMNH has a few localities across Virginia except for the far southwestern counties. Erwin (1981) had no records for Plummers Island.

32. *Amara impuncticollis* (Say). Seven specimens were captured at Quantico in floodplain hardwoods (site 1) and old field (site 2) habitats. The species is known from most of eastern United States and Canada. Most VMNH specimens are from the Coastal Plain, with a few from localities in the Piedmont and Ridge & Valley provinces. Erwin (1981) did not record it for Plummers Island.

33. *Amara angustata* (Say). Only one specimen was found at Quantico, from floodplain hardwoods during the fall period. Despite a wide range over much of North America east of the Rockies, *angustata* does not seem to be frequently collected. Erwin (1981: 166) recorded only three specimens from Plummers Island for the period 1907 to 1920, and the VMNH had no material from Virginia.

Tribe Oodini

34. *Oodes brevis* Lindroth. We examined 35 specimens of *brevis* from Quantico, all captured, as might be expected, at floodplain hardwoods site 1, most of them during the spring period. This hygrophilous species occurs in eastern United States north to Ontario; Virginia records are mostly from the Coastal Plain with a few on the eastern Piedmont. It was not recorded by Erwin (1981) for Plummers Island despite the availability of suitable habitats. The type locality is in Fairfax County.

35. *Anatrichis minuta* (Dejean). One specimen was collected at site 1 during the spring sampling period. The species occurs chiefly in the Atlantic and Gulf coastal plains from Massachusetts to Kansas. Erwin did not report it from Plummers Island.

Inclusion of Virginia in the state list for *minuta* by Bousquet & Larochelle (1993: 202) was based on an unpublished record of a specimen (VMNH) taken in Fontaine Swamp, Greensville Co., Virginia, 31 August 1979 (R. L. Hoffman, UV light). This specimen and that here reported from Quantico are the first to be documented in print for Virginia.

Tribe Chlaenini

36. *Chlaenius tomentosus* (Say). We examined 22 specimens of *tomentosus* collected in Quantico, all of them caught during the spring period in the old field sites 2 and 3. This widespread species occurs over most of the United States and southern Canada (Arizona to Quebec) except for peninsular Florida. Most Virginia localities are in the Coastal Plain and Piedmont. Erwin (1981: 166) reported that only two specimens of *tomentosus* were collected on Plummers Island, both of them prior to 1920.

37. *Chlaenius emarginatus* Say. This common species is represented by 90 specimens taken in all of the Quantico sites except upland hardwood site 4. About three-fourths were collected during the spring period. It is widespread over eastern North America: Nova Scotia and Michigan south to Kansas and Florida. The VMNH collection has material from across the state, but the majority of specimens are from Coastal Plain localities. Erwin (1981: 167) recorded "several" specimens from Plummers Island, "in moist areas in the forest above the secondary floodplain."

38. *Chlaenius aestivus* Say. One hundred fifty-nine specimens of this beetle were taken, in all sites except old field site 3, and nearly all during the spring period. The species occurs over most of eastern United States, north to Indiana and Massachusetts; it may be absent from southern Florida. Erwin (1981: 167) mentioned "many examples" taken on Plummers Island between 1902 and 1978, during both spring and late summer periods. The majority of Virginia specimens in VMNH are from the Coastal Plain and Piedmont; several counties west of the Blue Ridge are represented, however, by low-elevation localities in the Shenandoah and Roanoke valleys and from the far southwestern corner of the state. Bell (1960: 120) saw material chiefly from lowland localities, and noted the absence of records for "the higher Appalachians" which our data seem to confirm. A record for *aestivus* in the North Carolina mountains at Burnsville (Brimley, 1938: 126) may be based on an aeolian vagrant or mislabeled specimen.

39. *Chlaenius impunctifrons* Say. Only four specimens were taken, all of them during the spring period at floodplain hardwoods site 1. This possible predilictionfor low marshy habitat is confirmed by the statement of Erwin (1981: 168) that specimens at Plummers Island were "Found under stones on primary floodplain...." *C. impunctifrons* occurs over much of North America east of the Rockies, including southern Canada, and appears to be statewide in Virginia although nowhere abundant and not extending above 590 m. VMNH had no material from pitfall traps, perhaps because of the problems with installing them in the appropriate habitat. The VMNH specimens with collection data were taken, by hand, adjacent to streams, ponds, and boggy areas.

40. *Chlaenius tricolor* Dejean. Most of the 17 specimens of *tricolor* were collected in spring and all were from floodplain hardwoods (sites 1 and 5). The species' range covers North America from Newfoundland to Alberta, and south to Texas and Georgia. It appears to be statewide in Virginia, from sealevel to 1000 m in Tazewell and Grayson counties. Erwin (1981: 168) referred to "many specimens" taken on Plummers Island in floodplain habitats, March through October.

Tribe Licinini

41. *Dicaelus ambiguus* LaFerté-Sénectère. The 15 specimens taken at Quantico were from floodplain hardwoods (sites 1 and 5), old field (site 2 only), and upland hardwoods (site 4), most are from the spring sampling period. The species' range includes most of southeastern United States, from Pennsylvania to Iowa, south to Texas and northern Florida. In Virginia, *ambiguus* is common in the central and eastern lowlands, with a few disjunct localities in the southwestern mountains.

No material of this species from Virginia was seen by Ball (1959) for his revision of the Licinini, nor was it recorded for the state by Bousquet & Larochelle (1993). Erwin (1981: 170) reported that several specimens were collected from Plummers Island and its "adjacent shores", one of which is near Langley, Fairfax County, Virginia, but it is easy to understand how such an obscure reference could be overlooked. In any event, the VMNH material from Quantico and elsewhere now constitute formal documentation of *ambiguus* as a member of the Virginia biota.

42. *Dicaelus dilatatus dilatatus* Say. Four specimens were collected during the spring at Quantico, in floodplain hardwoods (site 5) and old field (site 2) habitats. The species in its broad sense ranges from New Hampshire to northern Florida, west to Iowa and Texas; the nominate subspecies is northern and eastern, from New England to Virginia. Erwin (1981: 171) stated that it was not found on Plummers Island after 1925, although abundant prior to that year. In Virginia, *D. d. dilatatus* is essentially statewide except for the far southwestern counties, where it is replaced by the subspecies *d. sinuatus* Ball.

43. *Dicaelus elongatus* Bonelli. Sixty-one specimens of this abundant member of the genus were taken mostly during the spring period at Quantico, from old field sites 2 and 3, but a few were from floodplain hardwoods (site 5 only), and upland hardwoods sites 4 and 6. The species ranges from southern Quebec to Iowa, and south to the Gulf; in Virginia it is essentially statewide but most material is from the Coastal Plain and Piedmont provinces, where pitfall sampling yields long series. Erwin (1981) stated that the only specimen found on Plummers Island was collected in 1901, suggesting that the occurrence was fortuitous.

44. *Dicaelus furvus* Dejean. All of the 29 specimens of

this species were taken during the spring period, 28 of them from upland hardwoods (site 6) and only one from old field (site 2) habitats. The range of *furvus* in its broad sense is basically southern (excluding peninsular Florida), extending northward to Pennsylvania in the east and Nebraska in the interior. Ball (1959: 122) restricted the range of the nominate subspecies to eastern Pennsylvania, Maryland, Virginia, and West Virginia; it remains to be ascertained whether the range of *D. f. carinatus* Dejean extends northward along the Coastal Plain to Virginia.

45. *Dicaelus politus* Dejean. All but one of the 39 specimens collected at Quantico during the spring period came from upland hardwoods site 6, suggesting a pronounced habitat preference. The single exception, taken at upland hardwoods site 4, was probably caught during random dispersal activity. The species is widespread over northeastern North America from Quebec and Iowa south through the Appalachians to Georgia and Alabama. It is nearly statewide in Virginia, but with only a few Coastal Plain localities. According to Erwin (1981: 170) *politus* is abundant on Plummers Island, under stones in mixed forest away from the floodplain.

46. *Dicaelus p. purpuratus* Bonelli. Thirteen specimens of this large and colorful carabid were collected at Quantico during both spring and fall seasons, in old field (site 3), floodplain hardwoods (site 5), and upland hardwoods (sites 4 and 6), suggesting adaptation to a variety of habitats. In its broad sense, the species occurs from Ontario and Minnesota south to Arizona and Florida. Within this area, Ball (1959: 148) recognized four subspecies, of which the nominate occupies most of the species' range, the other three occurring at the southern and western periphery. In Virginia, *purpuratus* is statewide, but with only sporadic occurrence in the mountains; by far most specimens in VMNH are from the Coastal Plain. Erwin (1981: 171) stated that it was abundant at Plummers Island (and adjacent shores) between 1902 and 1919, with none captured after that date.

47. *Badister notatus* Haldeman. A single specimen was collected at floodplain hardwoods site 5, during the spring period. Species of this genus are rarely taken by pitfall, and most are relatively scarce in collections. *B. notatus* is widespread over the United States east of the Mississippi, and north into Ontario. Most of the VMNH specimens are from the Virginia Coastal Plain, with a very few disjunct records for the Piedmont and Ridge & Valley provinces (at low elevations). Erwin (1981: 172) cited specimens from Plummers Island, in low damp places on secondary floodplain.

Tribe Harpalini

48. *Notiobia terminata* (Say). We examined 15 specimens of this carabid from the old field sites 2 and 3; most of them captured during the fall. The species has a wide range, from Newfoundland to North Dakota, south to Texas and Florida. In Virginia it is presumably statewide, although we have no records to date for the far southwestern counties. Erwin (1981: 178) reported that the only specimens found on Plummers Island were two taken in 1902, suggesting only incidental occurrence at that site.

49. *Anisodactylus agricola* (Say). Only one specimen was collected at Quantico, from floodplain hardwoods site 1 in the spring period. The species is widespread in much of eastern North America, but seems not to be frequently collected: VMNH has, for instance, only one specimen from each of the five physiographic provinces. Erwin (1981: 179) cited the species for Plummers Island, in several floodplain habitats.

50. *Anisodactylus nigerrimus* (Dejean). Of the 46 specimens captured at Quantico, the majority were found at old field sites 2 and 3, although sites 1, 5, and 6 also produced a few. All were taken during the spring period. The species' range is extensive, from Newfoundland to North Dakota and southward. It is statewide and common in Virginia, the VMNH material coming from all five regions of the state. But only three were captured at Plummers Island from 1902 through 1923 (Erwin (1981: 179).

51. *Anisodactylus ovularis* (Casey). Ten specimens were taken during the spring period at Quantico, from old field site 2 only. The range of *ovularis* includes most of United States east of the Great Plains, except for the southeastern states between Virginia and Texas. VMNH material was only from west of the Blue Ridge (Augusta, Montgomery, Roanoke counties), suggesting a disjunct status for the Quantico population, the more so as *ovularis* has not been found at Plummers Island.

52. *Anisodactylus rusticus* (Say). Of the 148 specimens of this species taken at Quantico, all but one were trapped

at the old field sites 2 and 3 during the spring period. The sole exception came from site 5 (floodplain hardwoods), presumably a dispersing migrant. The species ranges over much of the continent, as far west as Wyoming and Arizona, and is statewide in Virginia. In contrast to its abundance at Quantico, only one specimen, found in 1908, was reported by Erwin (1981: 179) for Plummers Island, suggesting only transient status.

53. *Amphasia interstitialis* (Say). Nineteen specimens of this species were collected at Quantico, at all sites except 2 and 4, all but one during the spring collecting period. The species occurs in northeastern North America from Quebec south and west to Arkansas, and it is statewide in Virginia. Erwin (1981: 180) reported "numerous specimens" being collected on Plummers Island "and adjacent shores."

54. *Stenolophus carbo* Bousquet. A single specimen of this species was captured at old field site 3 during the spring period. S. carbo (formerly known as carbonarius Say) occurs over much of eastern United States, east of the Great Plains, north to Ontario, but apparently missing from the southeastern States. However, it was not recorded for Virginia by Bousquet & Larochelle (1993), nor for Plummers Island by Erwin (1981). It was listed for North Carolina by Brimley (1938) but not for South Carolina (Kirk, 1969, 1970). The VMNH collection, however, has a specimen taken at Dam Neck Navy Base in the City of Virginia Beach (26 June 1991, Kurt A. Buhlmann). These two specimens therefore establish the occurrence of this species in Virginia.

55. *Stenolophus rotundatus* LeConte. One was collected from old field site 3 during the spring period. The species is widespread in eastern North America, from the Gulf Coast states to Ontario. Erwin (1981) did not record it from Plummers Island, and VMNH had only a single specimen from Russell County in the far southwestern part of Virginia.

56. *Harpalus erythropus* Dejean. Three specimens of this beetle were collected in both spring and fall at old field site 2 and upland hardwoods site 4. The species is widespread over North America east of the Rockies, including southern Canada. It is statewide in Virginia, and was found on Plummers Island until 1932, the last year of collection there.

57. *Harpalus faunus* Say. Most of the 68 Quantico specimens of this species were collected in the fall from old field site 2, the two exceptions having been captured in floodplain hardwoods site 1. *H. faunus* occurs in most of North America, from Quebec to Manitoba and southward to Arizona and the Gulf Coast states. The few VMNH specimens were taken in the Piedmont and Ridge & Valley provinces, but the species is doubtless statewide in range. Erwin (1981: 173) recorded several specimens from Plummers Island, 1902-1978, where it is obviously not common.

58. *Harpalus pensylvanicus* (DeGeer). This, the most abundant carabid at Quantico and probably in Virginia generally, is represented by 397 specimens trapped during the fall period. Although all sites yielded specimens, the vast majority (328) came from old field site 2. The species occurs over most of North America, and is statewide in Virginia, especially in areas of early succession. Curiously, it seems not to have been collected on Plummers Island after 1932 (Erwin 1981: 173).

59. *Harpalus caliginosus* (Fabricius). Only two specimens of this generally abundant beetle were taken at Quantico, one in spring, one in fall, at old field site 2 only. The species ranges over most of the contiguous states and southern Canada from Manitoba eastward. It is apparently statewide in Virginia, although there are no records for the far southwestern counties. Erwin (1981: 174) was able to record only a single specimen for Plummers Island, and that dating from 1905.

60. *Harpalus fulgens* Csiki. Two specimens from Quantico were taken in spring at old field sites 2 and 3. H. fulgens is one of the few Nearctic species of Harpalus with a chiefly southern range: peninsular Florida to Texas, and northward at low elevations to Iowa, western Pennsylvania, and Rhode Island. It is widespread in Virginia, with most VMNH specimens from the Coastal Plain and Piedmont regions. One specimen from 1400 m in Bath County is perhaps an aeolian vagrant. Erwin (1981: 175) considered the species to be common on Plummers Island as far back as 1903.

61. *Harpalus plenalis* Casey. Six specimens of this species were taken from old field sites 2 and 3, all of them during the spring period. As mapped by Noonan (1991, fig. 292), *plenalis* ranges entirely across Canada and extends southward along the major mountain systems

to Arizona, New Mexico, and North Carolina (with questionable localities in Arkansas and Texas). Noonan examined, but did not map, material from Thornton Gap, Page County, Virginia, as well as from the Black and Balsam mountains in western North Carolina. VMNH has a small series from Shenandoah Mountain in western Augusta County, Virginia, consonant with the foregoing range summary. The presence of *plenalis* at Quantico is therefore somewhat unexpected for this obviously boreal animal, and may represent an instance of climatic reliction.

62. *Harpalus herbivagus* Say. All of the 14 specimens from Quantico were collected at old field site 2, most of them during the spring period. This very widespread species occurs over most of the "lower 48" states and southern Canada, except for southern Texas and peninsular Florida. In Virginia it is probably statewide, although VMNH lacks material from the Coastal Plain. Erwin (1981: 175) noted that *herbivagus* has not been found on Plummers Island since 1905.

63. *Selenophorus gagatinus* Dejean. Six specimens were collected at Quantico, during both spring and fall periods, in old field sites 2 and 3. This species occupies a dominantly northeastern range from New Brunswick to Virginia, with disjunct areas in Arkansas-Texas and Georgia-Florida-Alabama. VMNH had material only from two localities - both above 1300 m - in western Virginia, suggesting that *gagatinus* should occur in western North Carolina although so far unrecorded from that state. The only Plummers Island record is for a single specimen found in 1915 (Erwin 1981: 176).

64. *Selenophorus opalinus* (LeConte). This species was found during both spring and fall periods at Quantico, most of the 33 specimens coming from old field sites 2 and 3. Upland hardwoods sites 4 and 6 also yielded a few individuals. It occurs from Quebec to South Dakota and Texas, and appears to be statewide in Virginia, although records are lacking for the far southwestern counties. Erwin (1981: 176) noted that the only specimen taken on Plummers Island was found in 1907, obviously another case of transience rather than resident population.

65. *Trichiotichnus autumnalis* (Say). Eighty-four specimens of this beetle were taken in floodplain hardwood site 5 and upland hardwoods sites 4 and 6, all but one of them during the spring period. The species' range includes Ontario and most of northeastern United States west to Wisconsin, and southward along the Atlantic coast to Georgia. It is doubtless statewide in Virginia, although records are lacking for the southwestern part of the state. It is known from Plummers Island only from four specimens taken in 1974

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66. *Trichiotichnus dichrous* (Dejean). Only a single specimen of this uncommon species was collected at Quantico, from upland hardwoods site 6 in the fall. It occurs over most of North America east of the Great Plains, and is probably statewide in Virginia, although VMNH has only a few specimens from scattered localities. Specimens were taken on Plummers Island and the adjacent Virginia shore between 1902 and 1932, none after the latter date (Erwin 1981: 176).

67. *Cratacanthus dubius* (Palisot de Beauvois). The only capture of this species at Quantico was one specimen at old field site 2 in the fall. Like many other harpalines, the species' range is general over North America east of the Rockies, and it is statewide in Virginia. Paralleling our results at Quantico, only one specimen has been found on Plummers Island, in 1902 (Erwin 1981: 173).

Tribe Platyini

68. *Calathus opaculus* LeConte. Most of the 31 specimens taken during this study came from old field sites 2 and 3, and upland hardwoods site 6. Only one was trapped at floodplain hardwoods site 1, suggesting capture during dispersal. The range of the species extends from Quebec to Wyoming and Colorado, southward to the Gulf. VMNH records suggest a statewide distribution, with perhaps greatest abundance in the Coastal Plain. It has not been found on Plummers Island (Erwin 1981).

69. *Synuchus impunctatus* (Say). We examined 66 specimens taken in both spring and fall trapping periods, at all sites except 2 and 3 in old field habitat. This species is transcontinental in Canada and northern United States, southward as far as Missouri and Virginia. VMNH specimens are from the Ridge & Valley, Piedmont, and Coastal Plain provinces, those from the City of Virginia Beach being apparently the southeasternmost known and presage discovery of impunctatus in North Carolina. The species was not found on Plummers Island, although one was taken on the adjacent Virginia shore of the Potomac (Fairfax

County) in 1905.

70. *Olisthopus parmatus* (Say). Two specimens of this carabid were collected during the spring at upland hardwoods site 6. The species is known from southern Canada and most states east of the Great Plains, and appears to be statewide in Virginia. It was not found on Plummers Island *per se*, but one specimen was found on the adjacent shore of the Potomac River in Montgomery Co., Maryland (Erwin 1981: 159).

71. *Agonum pallipes* (Fabricius). Only a single specimen was trapped at Quantico, in old field site 2 during the fall period. This predominantly southern species occurs as far north as Indiana and Maryland and west to Texas and Kansas. Its distribution in Virginia is uncertain; VMNH has only a few specimens from Piedmont localities and it may not occur west of the Blue Ridge. The lack of Coastal Plain records is noteworthy. Erwin (1981) did not list it for Plummers Island.

72. *Agonum punctiforme* (Say). Most of the 11 specimens collected at Quantico were collected during the spring at upland hardwoods site 6, but old field sites 2 and 3 and floodplain hardwoods site 1 also yielded a few specimens each. The range covers most of United States east of Kansas and Texas, but not extending north to Minnesota, Michigan, and Maine. *A. punctiforme* also appears to be statewide in Virginia, but was not found at Plummers Island (Erwin 1981).

73. *Agonum ferreum* Haldeman. One specimen was collected at floodplain hardwoods site 1 during the spring period, reflecting the species' recognized preference for low wet habitats. This species is widespread over United States east of the Mississippi and southern Ontario. It is statewide in Virginia, with most records for the Piedmont and Ridge and Valley provinces, and common at Plummers Island (Erwin 1981: 157).

74. *Platynus decentis* (Say). Fifty specimens captured, most of them during the spring, from floodplain hardwoods sites 1 and 5, and upland hardwoods sites 4 and 6. This species is transcontinental in North America except for the southwestern states and peninsular Florida, and VMNH material is from all parts of Virginia. Erwin (1981: 157) characterized it as abundant at Plummers Island.

Tribe Lebiini

75. *Cymindis americanus* Dejean. The four specimens taken at Quantico were all from uplands hardwoods sites 4 and 6, during the fall period. The range of americanus includes most of North America east of the Great Plains, north as far as Quebec. VMNH material is from all parts of Virginia, but the species appears to be most abundant in the Coastal Plain, and localities in the western mountains are at low elevations. Erwin (1981: 189) had no records for the species at Plummers Island.

76. *Apenes lucidulus* (Dejean). We examined only two Quantico specimens, both from uplands hardwoods site 6 during the spring period. The species is widespread in United States east of the Mississippi, and VMNH specimens are from all five physiographic regions. Erwin (1981: 189) reported that *lucidulus* was found on Plummers Island between 1902 and 1963, but none after the latter date.

Tribe Galeritini

77. *Galerita bicolor* (Drury). We obtained 18 specimens of this large gangling beetle during both spring and fall sampling periods from floodplains hardwoods site 1 and upland hardwoods sites 4 and 6. The species occurs over most of North America east of the Great Plains, and is statewide in Virginia. The lack of specimens from the two old field sites in interesting, since the species is commonly found under stones and logs in quite dry situations elsewhere in Virginia. The species is common at Plummers Island, under stones and beneath bark of logs on the floodplain (Erwin 1981: 190).

78. *Galerita janus* (Fabricius). Somewhat more abundant than the preceeding species, *janus* was captured at Quantico in both spring and fall, and at all sites except old field site 2. Most of the 51 specimens were from upland hardwoods sites 4 and 6 during the spring. The species has also a larger range than *bicolor*, extending from Quebec to Manitoba and Arizona, thence into Mexico. It is doubtless statewide in Virginia, although records are lacking for the extreme southwestern counties. Despite its abundance at Quantico, only three specimens of *janus* were found at Plummers Island, all between 1909 and 1922 (Erwin 1981: 190).

Summary

Seventy-eight species of carabids are reported from the Marine Corps base at Quantico, Virginia, in Stafford and Prince William counties. All specimens were taken by pitfalls placed in duplicate in three primary habitat types.

Five species, either omitted from the states of known occurrence in Bousquet & Larochelle (1993) or included on the basis of unpublished information, are herewith documented on the basis of specimens from Quantico (and elsewhere), bringing the total known for the state to 458; *Loxandrus brevicollis, Pterostichus commutabilis, Dicaelus ambiguus, Anatrichis minuta, Stenolophus carbo.*

The following ten species are the most abundant carabids taken at Quantico (without respect to season): *Harpalus pensylvanicus* (397), *Cyclotrachelus spoliatus* (324), *Pterostichus coracinus* (183), *Carabus vinctus* (170), *Myas coracinus* (160), *Chlaenius aestivus* (159), *Poecilus lucublandus* (152), *Anisodactylus rusticus* (148), *Chlaenius emarginatus* (90), *Harpalus faunus* (88).

A breakdown by season, to be presented in a subsequent report, will show that some of the abovelisted species were trapped only in the fall (e.g., *H. pensylvanicus),* some only in the spring (*A. rusticus*), and still others throughout the warmer months of the year.

Several species taken at Quantico normally occur in Virginia only on the Blue Ridge and westward. Their occcurrence on or near the Fall Line, some 35 miles east of the Blue Ridge front, suggests the possibility of postglacial disjunct status, but this idea must be tested by collecting in intervening areas (such as the Bull Run Mountains). These species are *Harpalus plenalis, Carabus serratus,* and *Anisodactylus ovularis.*

Several carabids which are generally very common entirely across Virginia were not captured at Quantico, and it is difficult to explain their absence. These are *Poecilus chalcites, Calosoma scrutator, Cicindela punctulata, Platynus cincticolle,* and *Stenolophus comma* .

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References

Ball, G. E. 1959. A taxonomic study of the North American Licinini, with notes on the Old World species of the genus *Diplocheila* Brullé. Memoirs of the American Entomological Society 16: 1-268.

Bell, R. T. 1960. A revision of the genus *Chlaenius* Bonelli (Coleoptera, Carabidae) in North America. Miscellaneous Publications of the Entomological Society of America 1(3): 97-166.

Bosquet, Y. & A. Larochelle. 1993. Catalogue of the Geadephaga (Coleoptera: Trachypachidae, Rhysodidae, Carabidae including Cicindelini) of America north of Mexico. Memoirs of the Entomological Society of Canada 67: 1-197.

Brimley, C. S. 1938. The Insects of North Carolina. North Carolina Department of Agriculture, Raleigh, NC. 560 pp.

Davidson, R. L. 1995. First Virginia records for ten species of Carabidae (Coleoptera). Banisteria 5: 16-19.

Erwin, T. L. 1981. The ground beetles of a temperate forest site (Coleoptera: Carabidae): an analysis of fauna in relation to size, habitat selection, vagility, seasonality, and extinction. Bulletin of the Biological Society of Washington 5: 104-224.

Ferguson, H. J., & R. M. McPherson. 1985. Abundance and diversity of adult Carabidae in four soybean cropping systems in Virginia. Journal of Entomological Science 20:163-171.

Freitag, R. 1969. A revision of the species of the genus *Evarthrus* LeConte (Coleoptera: Carabidae). Quaestiones entomologicae 5: 89-212.

Gibbons, J. W., and R. D. Semlitsch. 1982. Terrestrial drift fences with pitfall traps: an effective technique for quantitative sampling of animal populations. Brimleyana 7: 1-16.

Kirk, V. M. 1969. A list of beetles of South Carolina. Part 1 - Northern Coastal Plain. South Carolina Agricultural Experiment Station Technical Bulletin 1033: 1-124.

Kirk, V. M. 1970. A list of beetles of South Carolina. Part 2 - Mountain, Piedmont, and Southern Coastal Plain. South Carolina Agricultural Experiment Station Technical Bulletin 1038: 1-117.

Los, L.M., & W.A. Allen. 1983. Abundance and diversity of adult Carabidae in insecticide-treated alfalfa fields. Environmental Entomology 12:1068-1078.

Mitchell, J. C., S. Y. Erdle, and J. F. Pagels. 1993. Evaluation of capture techniques for amphibian, reptile, and small mammal communities in saturated forested wetlands. Wetlands 13: 130-136.

Noonan, G. R. 1991. Classification, cladistics, and natural history of native North American *Harpalus* Latreille (Insecta: Coleoptera: Carabidae: Harpalini), excluding subgenera *Glanodes* and *Pseudophonus*. Monographs of the Thomas Say Foundation (Entomological Society of America) 13: 1-310.

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Observations on *Sorex longirostris* (Mammalia: Soricidae) and Associates in Eastern Portions of the Historical Great Dismal Swamp

Sandra Y. Erdle[1] and John F. Pagels[2]
Department of Biology
Virginia Commonwealth University
Richmond, Virginia 23284-2012

Museum specimens and associated data stored in natural history museums have become increasingly important resources. Such specimens can have great biological, economic and political value. In portions of southeastern Virginia, biological surveys and resultant specimens have assumed much importance as metropolitan areas expand and land use is altered. One of the animals that has been the focus of interest in this area is the southeastern shrew, *Sorex longirostris* Bachman. Of three subspecies currently recognized, the nominate form, *S. l. longirostris*, is distributed throughout much of the southeastern portion of the United States, *S. l. eonis* is restricted to portions of Florida, and *S. l. fisheri* is found in and nearby the Great Dismal Swamp of Virginia and North Carolina.

In 1986, the U.S. Fish and Wildlife Service listed the Dismal Swamp southeastern shrew, *S. l. fisheri*, as threatened. Primary reasons for its listing were the shrew's very limited range and the potential for genetic swamping, or a loss of the taxon, because of increased contact between *S. l. fisheri* and *S. l. longirostris*. In particular, outside the Great Dismal Swamp National Wildlife Refuge (GDSNWR) loss of swamp habitat has occurred primarily because of ditching, draining and clearing for agriculture, urban development, and other land uses. Such activity may provide inroads of suitable habitat for *S. l. longirostris* into existing *S. l. fisheri* habitat. Rose et al. (1987) reported specimens of intermediate size along the perimeter of the GDSNWR. Rose & Padgett (1991) summarized various aspects of the biology of *S. l. fisheri*, including threats to its existence.

Ongoing studies of *S. longirostris* in southeastern Virginia that have included expanded field surveys, additional morphometric analyses and molecular analyses (personal communications, N. D. Moncrief, Virginia Museum of Natural History; R. K. Rose, Old Dominion University; W. D. Webster, University of North Carolina at Wilmington) are nearing completion. These studies should provide a wealth of information on the distribution of *S. longirostris* in southeastern Virginia and northeastern North Carolina, and resolve current systematic problems. Information reported herein further delineates ranges of *S. l. fisheri* and *S. l. longirostris* in eastern portions of the historical Great Dismal Swamp. It also emphasizes importance of biological surveys and how sampling for a target species can provide baseline data on other forms, or may lead to additional questions of biological significance.

Materials and Methods

Twenty-four sites were sampled in the Cities of Chesapeake and Virginia Beach (Fig. 1) from June 1990

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[1] present address: Virginia Department of Conservation and Recreation, Division of Natural Heritage, 1500 East Main Street - Suite 312, Richmond, Virginia 23219

[2] to whom correspondence should be addressed

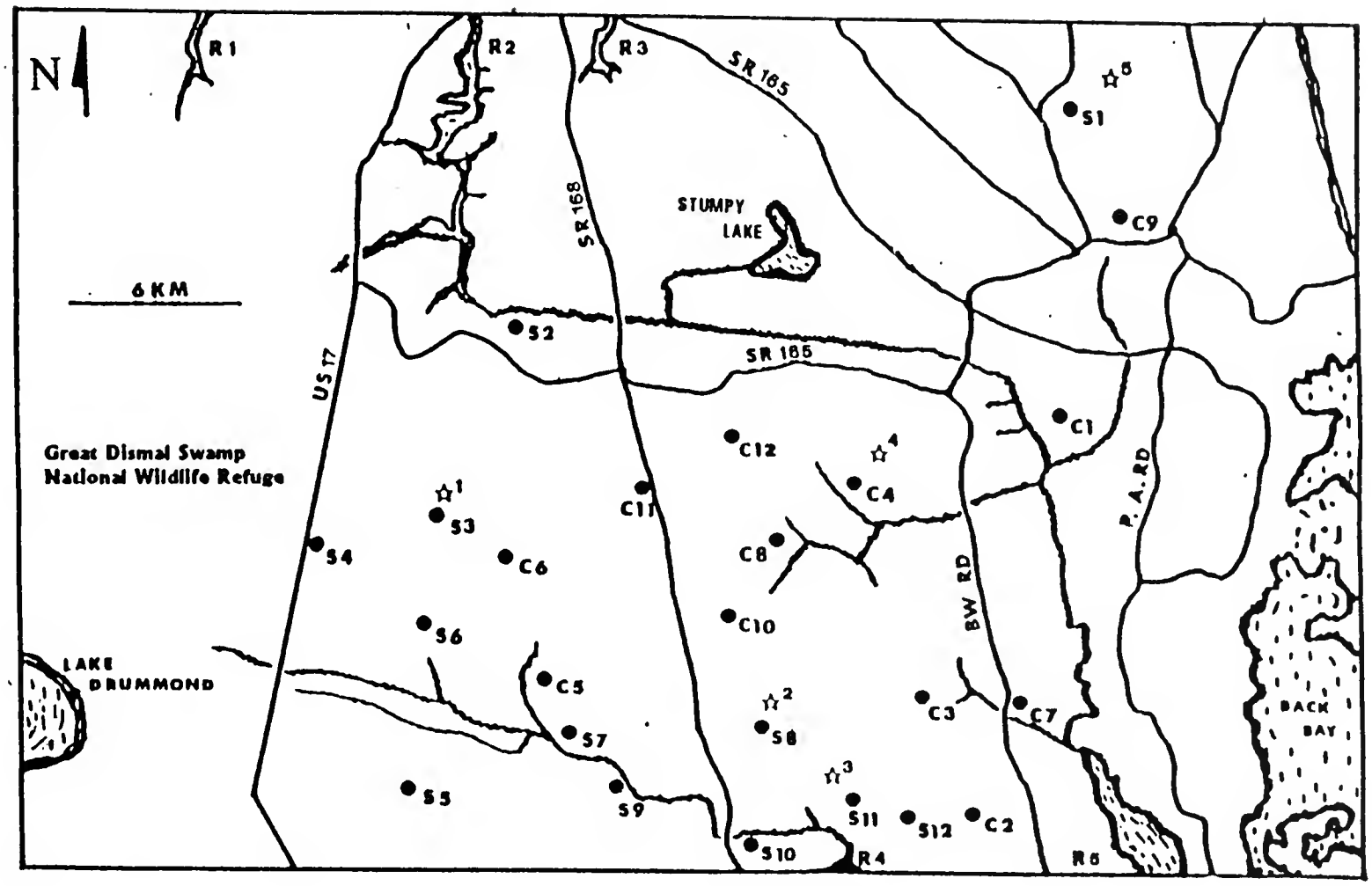

Figure 1. Map of portions of the cities of Chesapeake and Virginia Beach, Virginia, with collection sites indicated by dots. Trap sites at the sites S1 to S12 and C1 to C12 are noted in Table 1 and described in the text. Stars with numerals indicate landmarks: 1 is Chesapeake Municipal Airport, 2 is St. Brides Correctional Center, 3 is Northwest River Park, 4 is Fentress Naval Air Station, and 5 is Oceana Naval Air Station. Rivers are indicated by the letter "R" and numerals: R1, R2, and R3 are portions of the Western Branch, Southern Branch, and Eastern Branch of the Elizabeth River, respectively, and R4 and R5 are the Northwest River and the North Landing River, respectively.

to November 1991. Habitats sampled ranged from grassy fields to forests of various ages and types (Table 1). Because of the patchiness of habitat types in the study area, a range of habitat types was sampled at many sites. Pitfall traps were used in all sampling sites, either with a drift fence and 3.8-l (#10 tin cans) pitfalls (fence on Table 2) at each end, or with smaller 0.47-l (16 oz aluminum cans) pitfalls (can on Table 2) without drift fences, or both. Plastic 7.6-l (two gallon buckets) pitfalls were also used at site S3. Traps were half filled with a dilute formalin solution to facilitate drowning and for preservation of specimens. Traps were checked approximately bi-monthly. Standard external measurements were taken from fluid preserved specimens. Skulls of all *Sorex longirostris* were removed and cleaned. Specimens were deposited in the Virginia Commonwealth University Mammal Collection. Additionally, visual comparisons were made of shrews captured in this study with specimens of *S. l. fisheri*, including topotypes, at the U.S. National Museum of Natural History (USNM).

Results and Discussion

A total of 254 mammals was captured representing 12 species (Table 2). The method of sampling, primarily 3.8-l and smaller cans, yielded a high proportion of shrews, 78% of all captures. This result was not unexpected (see Mitchell et al., 1993).

Table 1. General habitat type for each of the sites sampled. Abbreviations: hardwood forest (hw), grassy field (gr), mixed hardwood and pine (mi), pine forest (pw), sappling (sapl), shrub (shr), sites with drift fences (S), sites without drift fences (C). Hw/mi indicates forests that were primarily hardwood but contained scattered pines. "X" indicates a habitat type within a site. A dashed line indicates the range of habitats within a site. An asterisk in parentheses indicates sites of capture of *Sorex longirostris* spp.

Site	Old field			Edge	Forest	
	gr	gr/shr	shr/sapl	Shrub/forest	young	mature
S1						hw(*)
S2		X[a]				
S3	X(*)----	X----		X----	X----	Pine (*)
S4					----hw(*)----	
S5		X(*)[b]				
S6					----mixed(*)----	
S7						hw(*)
S8				X(*)		hw
S9				X(*)		
S10				X	mixed(*)	
S11						hw/mi
S12						hw/mi[c]
C1					pine(*)	
C2				X(*)		
C3				X		
C4				----shrub----		
C5						X(*)[d]
C6					----pine----	
C7				X(*)		
C8		X		X		
C9				X(*)		
C10			X			
C11			X			
C12		X	X	X(*)	----shrub----	

[a] Edge of marsh

[b] 5-20m from mature swamp forest

[c] Swamp edge

[d] Much cypress

All five species of shrews known from the Coastal Plain of Virginia, southeastern shrew, *Sorex longirostris* (Sll and Slf, see Table 1), pygmy shrew, *S. hoyi* (Sh), least shrew, *Cryptotis parva* (Cp), short-tailed shrew, *Blarina brevicauda* (Bb), and the southern short-tailed shrew, *B. carolinensis* (Bc), were taken in the relatively small area sampled.

Sorex hoyi was known from only seven sites in Virginia in 1980 (Handley et al., 1980), and although now known from many more sites and a broad range of elevations, it was still considered one of Virginia's rarest shrews less than 10 years ago (Pagels, 1987). The pygmy shrew was first reported from the vicinity of the Great Dismal Swamp in Camden and Gates counties in North Carolina (Padgett & Rose, 1994). As a result of recent efforts to study Virginia's shrews and the use of highly-effective pitfall traps, *S. hoyi* is now known to have the greatest distribution (elevation, longitude and latitude) of any Virginia shrew.

Four species of shrews were captured at site S7, among them *Blarina brevicauda* and *B. carolinensis*, species that are contiguously allopatric in most of the central to eastern portions of North America where their ranges meet. Their presence together in the present study is one of the few situations where they are known to be sympatric (Tate et al., 1980; Pagels & French, 1987).

Sorex longirostris was captured at 16 of 26 sites. The 54 specimens of this species comprised 22% of total mammal captures, similar to the 20.6% for *S. longirostris* reported by Rose et al. (1987) in a study that used 3.8-l cans as pitfall traps set in a grid. Pagels et al. (1992) used 19-l buckets in a study of small mammals in Cumberland County, Virginia, and though rodents represented a much higher percentage of mammals captured in those large traps, *S. longirostris* still represented more than 11% (86 of 754) of mammals captured in this Piedmont study. Specimens from the Piedmont study and from this study more than tripled the number of *S. longirostris* known from Virginia as recently as 1982 (Pagels et al. 1982).

French (1980) reported that the isolated subspecies, *S. l. eionis* and *S. l. fisheri*, are approximately 20% greater in total body length than *S. l. longirostris*. Padgett et al. (1987), Rose et al. (1987), Jones et al. (1991), and Padgett (1991) provided additional observations on identification of *S. l. longirostris* and *S. l. fisheri* in southeastern Virginia. Although total length is of questionable systematic value, and can vary a great deal depending on specimen condition and measurement technique, it can be helpful in sorting specimens into different size groups. Total lengths of our specimens ranged from 77 mm to 90 mm. If shrews with a total length of 90 mm are designated as *S. l. fisheri* (see Rose et al., 1987; Padgett, 1991), those 85-88 mm as intermediates (intergrades), and those 84 mm and less, as *S. l. longirostris*, then specimens referrable to both taxa, *S. l. longirostris* and *S. l. fisheri*, are represented in our sample, as well as specimens that are intergrades. Skulls of our largest specimens compared favorably with topotype specimens of *S. l. fisheri* at the USNM, however we made no comparative measurements.

The largest specimens, i.e., those referrable to *S. l. fisheri*, were caught nearest (S4, S5, C6) the Dismal Swamp (Table 2, Figure 1). The smallest specimens, i.e., those referrable to *S. l. longirostris*, were caught throughout the study area. That small specimens were captured in the same area as the largest specimens would seem to be important in assessing the distributional dynamics of the two taxa.

Sorex longirostris was captured in most habitats sampled. Our findings relating to habitat were similar to existing information on *S. l. longirostris* in much of Virginia (for example, Pagels et al., 1982; Pagels & Handley, 1989), and data from studies in and near the Great Dismal Swamp (for example, Rose, 1981; Rose et al., 1987; Rose et al., 1990). Rose & Padgett (1991) summarized that "...*S. l. fisheri* persists within the mature forests of the Dismal Swamp at relatively low densities, but quickly invades and increases in numbers in early to mid-successional habitats created by clearing....". Unfortunately, such habitats that have been altered by draining are also desirable for *S. l. longirostris*, which may lead to genetic extinction of *S. l. fisheri* if its range is indeed restricted to the vicinity of the Great Dismal Swamp.

All other captures were rodents; harvest mouse, *Reithrodontomys humulis* (Rh), white-footed mouse, *Peromyscus leucopus* (Pl), marsh rice rat, *Oryzomys palustris* (Op), hispid cotton rat, *Sigmodon hispidus* (Shi), meadow vole, *Microtus pennsylvanicus* (Mpe), pine vole, *Microtus pinetorum* (Mpi), and house mouse, *Mus musculus* (Mm). Interestingly, rodents were represented by only a small percentage (22%) of total mammal captures.

Table 2. Numbers of captures of small mammals in 24 study sites in the cities of Chesapeake and Virginia Beach, Virginia. Trap types are described in the text and site localities are plotted on Figure 1. Abbreviations for each species captured are in the text.

Site	trap	Sll	SlF	Sh	Cp	Bb	Bc	Rh	Pl	Op	Shi	Mpe	Mpi	Mn	Tot
S1	fence	2	0	0	0	0	16	4	3	0	0	2	0	0	27
	can	1	0	0	0	0	6	0	0	0	0	0	0	0	7
S2	fence	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	can	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S3	fence	0	0	0	3	1	0	1	0	0	0	1	0	0	6
	can	0	0	0	5	0	0	0	0	0	0	0	0	0	5
	bucket	3	0	0	7	0	3	6	0	0	0	0	0	1	20
S4	fence	3	1	1	0	7	0	0	2	0	0	0	0	0	14
S5	fence	4	2	0	3	0	0	1	2	0	0	0	0	0	12
	can	6	0	0	1	4	0	0	0	0	0	0	0	0	11
S6	fence	0	0	0	0	3	0	1	2	0	0	0	0	0	6
	can	2	0	0	1	1	0	0	0	0	0	0	0	0	4
S7	fence	4	0	0	2	1	4	1	3	0	0	0	0	0	15
S8	fence	0	0	0	1	0	6	1	1	0	0	1	1	0	11
	can	5	0	0	0	0	8	0	0	0	0	0	0	0	13
S9	fence	3	0	0	1	0	2	1	0	1	0	0	1	0	9
S10	fence	3	0	0	0	1	5	1	0	0	0	1	0	0	11
	can	0	0	0	0	0	5	0	0	0	0	0	0	0	5
S11	fence	0	0	0	2	0	3	1	0	0	0	0	0	0	6
	can	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S12	fence	0	0	0	0	0	1	0	2	0	0	0	0	0	3
	can	0	0	0	0	0	2	0	0	0	0	0	0	0	2
C1	can	4	0	0	0	0	4	1	0	0	0	0	0	0	9
C2	can	2	0	0	0	0	4	0	0	0	0	0	0	0	6
C3	can	0	0	0	0	0	4	0	1	0	0	0	0	0	5
C4	can	0	0	0	0	0	4	2	0	0	0	0	0	0	6
C5	can	3	0	0	0	0	0	0	0	0	0	0	0	0	3
C6	can	1	1	0	0	0	0	0	0	0	0	0	0	0	2
C7	can	2	0	0	1	0	1	1	0	0	0	0	1	0	6
C8	can	0	0	0	0	0	2	1	1	0	0	1	1	0	6
C9	can	1	0	0	0	0	3	0	0	0	0	0	0	0	4
C10	can	0	0	0	0	0	6	0	2	0	0	0	0	0	8
C11	can	0	0	0	0	1	2	0	0	0	1	0	1	0	5
C12	can	1	0	0	0	0	5	0	0	0	0	0	0	0	6
Total		50	4	1	27	22	93	23	20	1	1	6	5	1	254

These results are again indicative of the efficacy of small pitfall traps when sampling for shrews, and the need for multiple capture techniques when attempting to assess entire small mammal populations (Mitchell et al., 1993).

In summary, pitfall sampling in this study that used a relatively simple spot-trapping technique provided data that may be useful in evaluating the status of a threatened species and its small mammal associates.

Acknowledgements

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Literature Cited

French, T. W. 1980. Natural history of the southeastern shrew, *Sorex longirostris* Bachman. American Midland Naturalist 104:13-31

Handley, C. O., Jr., J. F. Pagels, & R. H. deRageot. 1980. Pygmy shrew, *Microsorex hoyi winneman* Preble. Pp. 545-547. In D. W. Linzey (ed.), Proceedings of endangered and threatened plants and animals of Virginia. Center for Environmental Studies, Virginia Polytechnic Institute and State University, Blacksburg, VA.

Jones, C. A., S. R. Humphrey, T. M. Padgett, R. K. Rose, & J. F. Pagels. 1991. Geographic variation and taxonomy of the southeastern shrew (*Sorex longirostris*). Journal of Mammalogy 72:263-272.

Mitchell, J. C., S. Y. Erdle, & J. F. Pagels. 1993. Evaluation of capture techniques for amphibian, reptile, and small mammal communities in saturated forested wetlands. Wetlands 13:130-136.

Padgett, T. M. 1991. The identification, distribution, and status of the threatened Dismal Swamp shrew (*Sorex longirostris fisheri*). Unpublished Master of Science thesis. Old Dominion University, Norfolk, VA. i-vi+59pp.

Padgett, T. M., R. K. Everton, & R. K. Rose. 1987. The identification of the threatened southeastern shrew using multivariate statistical techniques. Virginia Journal of Science 38:351-357.

Padgett, T. M., & R. K. Rose. 1994. The pygmy shrew, *Sorex hoyi winnemana* (Insectivora: Soricidae), from the Coastal Plain of North Carolina. Brimleyana 21:87-90.

Pagels, J. F. 1987. The pygmy shrew, rock shrew and water shrew: Virginia's rarest shrews (Mammalia: Soricidae). Virginia Journal of Science 38:364-368.

Pagels, J. F., & T. W. French. 1987. Discarded bottles as a source of small mammal distribution data. The American Midland Naturalist 118:217-219.

Pagels, J. F., & C. O. Handley, Jr. 1989. Distribution of the southeastern shrew, *Sorex longirostris* Bachman, in Western Virginia. Brimleyana 15:123-131.

Pagels, J. F., C. S. Jones, & C. O. Handley, Jr. 1982. Northern limits of the southeastern shrew, *Sorex longistris* Bachman (Insectivora: Soricidae), on the Atlantic Coast of the United States. Brimleyana 8:51-59.

Pagels, J. F., S. Y. Erdle, K. L. Uthus, & J. C. Mitchell. 1992. Small mammal diversity in forested and clearcut habitats in the Virginia Piedmont. Virginia Journal of Science 43:171-176.

Rose, R. K. 1981. Small mammals in openings in Virginia's Dismal Swamp. Brimleyana 6:45-50.

Rose, R. K., R. K. Everton, & T. M. Padgett. 1987.

Distribution and current status of the threatened Dismal Swamp southeastern shrew, *Sorex longirostris fisheri*. Virginia Journal of Science 38:358-363.

Rose, R. K., R. K. Everton, J. F. Stankavich, & J. W. Walke. 1990. Small mammals in the Great Dismal Swamp of Virginia and North Carolina. Brimleyana 16:87-101.

Rose, R. K., & T. M. Padgett. 1991. Southeastern shrew. *Sorex longirostris fisheri* Merriam. Pp 562-564 *In* K. Terwilliger (Coordinator), Virginia's Endangered Species. McDonald and Woodward Publishing Company. Blacksburg, VA.

Tate, C. M., J. F. Pagels, & C. O. Handley, Jr. 1980. Distribution and systematic relationship of two kinds of short-tailed shrews (Soricidae: *Blarina*) in south-central Virginia. Proceedings of the Biological Society of Washington 93:50-60.

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A New Station for Smooth Cliffbrake, *Pellaea glabella*, (Pteridaceae) on Masonry Walls

Thomas F. Wieboldt
Massey Herbarium, Department of Biology
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061

During June 1995, I was shown a luxuriant population of cliffbrakes (*Pellaea*) growing in mortar on the walls of Owens Hall on the campus of Virginia Polytechnic Institute and State University in Montgomery County, Virginia. Numerous plants of both *Pellaea atropurpurea* and *glabella* grow together here in an area previously deeply shaded and hidden from view by shrubbery. Although both *Pellaea* species occur predominantly on natural outcroppings of limestone or dolomite, *P.atropurpurea* occurs on a wider variety of rock types and has been recorded a number of times on old stone or brick walls (Massey, 1944). *Pellaea glabella*, on the other hand, is much more restricted both geographically and in habitat preference.

Although at the southeastern edge of its range and once thought to be quite uncommon in Virginia, *P. glabella* is characteristic of limestone or dolomite palisades that occur along major rivers and large creeks. It is now known from many counties in the Great Valley in Virginia. There are few occurrences of this fern on man-made structures. A search through past issues of the American Fern Journal yielded only two accounts of masonry structures as habitat for *P. glabella*. Interestingly, one such report provides a photograph of another site in Montgomery County where this fern occurs on "wing-walls of a railroad culvert" over Plum Creek (Knight, 1939; Massey, 1944). This station is only a few hundred meters from a natural outcrop where the species also occurs. By contrast, the VPI & SU station is at the very least 8.8 kilometers distant. This, of course, poses no problem as the tiny spores are easily airborne and transported long distances. Knight's note in the American Fern Journal is followed 4 years later by a note by Edgar T. Wherry (1943) reporting stations in

Berks, Bucks, and Philadelphia counties, Pennsylvania, on masonry along railroads.

The usual habitat of *Pellaea glabella* is described by Shaver (1954) as "mainly the sheer, vertical limestone bluffs near waterfalls or north-facing, vertical limestone cliffs by rivers, and especially such bluffs as are near the water." The limestone masonry, otherwise known as "Hokie stone", which faces most of the buildings on the Virginia Tech campus would seem to bear about as close a similarity to this habitat as any man-made structure might, save the proximity to water. The plants grow from mortar cracks which are well weathered. A search for other occurrences on the older buildings surrounding the Drill Field revealed only a few plants on Eggleston Hall which is adjacent to Owens. Although descriptors such as "north-facing" and "near water" often describe the habitat of this fern, in my experience, its often exposed setting appears to be a hot and dry microsite. The site on Owens is on a northerly exposure and was also deeply shaded by shrubbery immediately adjacent to the building. This protected setting may have ameliorated an otherwise harsh environment. With the shrubbery now cleared away, it will be interesting to see what changes if any will occur as a result of changes in the microclimate of the site.

Literature Cited

Knight, W.R. 1939. An unusual habitat for *Pellaea glabella*. American Fern Journal 29:32-33.

Massey, A.B. 1944. The ferns and fern allies of Virginia. Bulletin of the Virginia Polytechnic Institute, Number 37. Blacksburg, VA. 110 pp.

Shaver, J.M. 1954. Ferns of Tennessee, with the fern allies excluded. George Peabody College for Teachers. Nashville, TN. 502 pp.

Wherry, E.T. 1943. *Pellaea glabella* on masonry. American Fern Journal 33:138-139.

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First Record of *Tamiophila grandis* (Insecta: Siphonaptera) from Virginia.

Ralph P. Eckerlin and Harry F. Painter
Natural Sciences Division
Northern Virginia Community College
Annandale, VA 22003

A single female of the giant flea, *Tamiophila grandis* (Rothschild) was collected by Gerald E. Meier on 20 October 1989 from a female Eastern Chipmunk, *Tamias striatus* (L., 1758) from Burkes Garden, Tazewell County, Virginia. On 14 November 1993, another female *T. grandis* was collected by Ralph P. Eckerlin from a male chipmunk, also from Burkes Garden. Both flea specimens have been deposited in the collection at Northern Virginia Community College as accession numbers M-Ts[1]-89 and M-Ts[2]-93 respectively. We have examined 27 chipmunks from Virginia, yet only two were infested, a 7.4% prevalence.

In the United States, *Tamiophilia grandis* is known from 12 states (CT, MA, ME, MI, MN, NH, NY, OH, PA, RI, VT, WI) (Benton,1980). In Canada, records exist from southern Ontario, eastern Quebec, and southern New Brunswick (Holland, 1985). The locality nearest to the present site is in Somerset County, PA (Holland & Benton, 1968) approximately 335 km to the north. This is the first record from Virginia and also the southernmost locality known for *T. grandis*.

Holland (1985) remarked that the distribution of *T.*

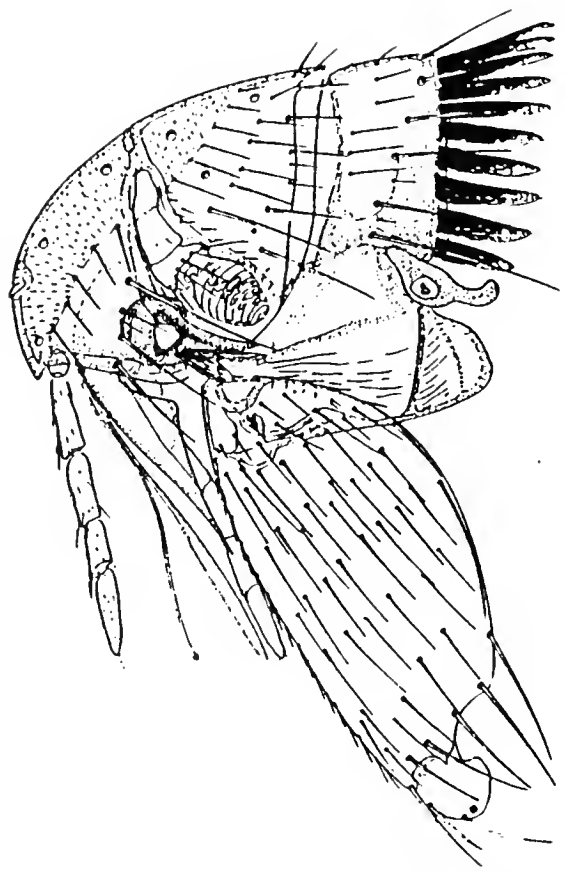

Figure 1. *Tamiophila grandis* - head, prothorax, and procoxa of female from Burkes Garden, VA

grandis does not coincide with the entire range of its chipmunk host. The Eastern Chipmunk ranges from Nova Scotia and New Brunswick in the northeast to Manitoba in the northwest, and to Oklahoma and northwest Florida in the south (Hall,1981). Although it is not found in the Piedmont of North Carolina, South Carolina, and Georgia, the chipmunk is found in the Appalachian mountains south to Georgia.

Tamiophila grandis has had an involved taxonomic history. It was described as *Typhlopsylla grandis* by Rothschild (1902), transferred to *Ctenopthalmus* by Baker (1905), then to *Neopsylla* by Rothschild (1915). Jordan (1938) created the genus *Tamiophila* to accommodate the sole species *T. grandis*. Several synonyms also exist. It is placed in the family Hystrichopsyllidae, subfamily Neopsyllinae.

Tamiophila grandis is recognized by the following combination of characters: both genal and pronotal combs present, the genal comb of two spines crossing each other, frontal tubercle present, eye vestigial (Fig.1), abdominal terga with spinelets, sternite 9 of male with fringe of long bristles, and the large size of 4-6 mm.

The chipmunk appears to be the true host; however, Fox (1940) reports that other hosts include "cottontail rabbit"; Red Squirrel, *Tamiasciurus hudsonicus* (Erxleben, 1777); and " weasel," *Mustela noveboracensis* (Emmons, 1840) (= *M. frenata* Lichtenstein, 1831). Osgood (1964) dug *T. grandis* out of chipmunk nests, and this flea is probably a nest inhabitant. For this reason, specimens of *T. grandis* are rare in collections. Most records are females collected in spring and fall (Benton, 1980). Both of our records are females taken in the fall.

We gratefully acknowledge the help of Gerald E. Meier, who spent many days in the field with us and who collected the first specimen of *T. grandis*. The comments of an anonymous reviewer improved the manuscript.

Literature Cited

Baker, C. F. 1905. The classification of the American Siphonaptera. Proceedings of the United States National Museum 29 (1417):121-170.

Benton, A. H. 1980. An Atlas of the Fleas of the Eastern United States. Marginal Media, Fredonia NY, 177pp.

Fox, I. 1940. The Fleas of Eastern United States. Iowa State College Press, Ames, IA. 191pp.

Hall, E. R. 1981. The Mammals of North America. Volume I., John Wiley and Sons, New York, NY. 600 pp.

Holland, G. P. 1985. The Fleas of Canada, Alaska, and Greenland (Siphonaptera). Memoirs of the Entomological Society of Canada Number 130. Ottawa, Canada. 631 pp.

Holland, G. P., & A.H.Benton. 1968. Siphonaptera from Pennsylvania mammals. American Midland Naturalist 80:252-261.

Jordan, K. 1938. On some nearctic Siphonaptera. Novitates Zoologicae 41:119-124.

Osgood, F. L. 1964. Fleas of Vermont. Journal of the New York Entomological Society 72:29-33.

Rothschild, N. C. 1902. Some new nearctic fleas. The Entomologist's Record and Journal of Variation 14:1-2.

Rothschild, N. C. 1915. On *Neopsylla* and some allied genera of Siphonaptera. Ectoparasites 1:30-44.

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New Records of the Damselfly *Ischnura prognata* in Virginia

Dirk J. Stevenson, Steven M. Roble and Christopher S. Hobson
Virginia Department of Conservation and Recreation
Division of Natural Heritage
1500 E. Main Street, Suite 312
Richmond, VA 23219

In a recent review of the damselflies of Virginia, Roble (1994) reported that *Ischnura prognata* (Hagen) was apparently among the rarest of the 53 species known from the state. Only one historical (1938) and one recent (1994) record were known for *I. prognata* from the City of Williamsburg and Surry County, respectively. This species is scarce throughout its range, which extends from southeastern New York south to Florida and west to Indiana and eastern Texas (Donnelly, 1992; Dunkle, 1990). Its preferred habitats are swamp edges and shaded seepage areas (Dunkle, 1990).

During the 1995 field season, we encountered *I. prognata* in eastern Virginia with surprising frequency despite the lack of a directed survey for this species. Beating vegetation with sweep nets was an effective means of flushing the adults, which were then easily captured. The following six new city and county records were documented:

Accomack Co.: Wallops Flight Facility, 2.2 km NE of Wattsville, 23 May 1995, C. S. Hobson, 1 male;

City of Chesapeake: Northwest River, approximately 4.0 km SE of Northwest, 10 May 1995, D. J. Stevenson, 2 males (one collected); same site, 21-22 May 1995, D. J. Stevenson, 8 males and 4 females observed; Northwest River Park, Smith Creek at Baum Road boat launch, 4 October 1995, S. M. Roble, 1 female;

Fairfax Co.: Fort Belvoir, 2.0 km S of Pohick (junction Routes 1 and 611), 30 May 1995, S. M. Roble, 2 females; Greensville Co.: Fontaine Creek at Route 301, 7 May 1995, D. J. Stevenson, 1 male;

City of Virginia Beach: ditch adjacent to Pungo Ferry Road on west side of North Landing River, 10 May 1995, D. J. Stevenson, 2 females;

York Co.: City of Newport News Grafton Ponds Natural Area Preserve, 15 May 1995, D. J. Stevenson, 4 males and 2 females (2 males collected); same site, 18 May 1995, D. J. Stevenson, 2 females (one collected).

The specimens collected on 7 May and 4 October represent new early and late flight dates, respectively, for *I. prognata* in Virginia (Roble, 1994). The Fort Belvoir site is the first record for this species from the vicinity of Washington, D. C. (Donnelly, 1961; Orr, 1995a, 1995b). The habitat at this site, as well as that in Accomack County, is a forested seepage wetland. All of our other collection sites except those in York County are bottomland hardwood swamps. The dozen *I. prognata* adults observed on 21-22 May in the City of Chesapeake were in mature bald cypress (*Taxodium distichum*)-tupelo gum (*Nyssa aquatica*) swamp forest adjacent to the Northwest River. Most of these individuals were flushed from shallow portions of the swamp supporting profuse growth of lizard tail (*Saururus cernuus*) and sedges (*Carex* spp.). The two York County collections were made at semipermanent sinkhole ponds.

These new collections reveal that *I. prognata* is considerably more common in Virginia than previously believed. The dearth of previous records is attributed to limited survey efforts in appropriate habitats in the past. This species undoubtedly occurs

in additional swampy habitats in southeastern Virginia.

Acknowledgments

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Literature Cited

Donnelly, T. W. 1961. The Odonata of Washington, D. C., and vicinity. Proceedings of the Entomological Society of Washington 63: 1-13.

Donnelly, T. W. 1992. The Odonata of New York. Bulletin of American Odonatology 1(1): 1-27.

Dunkle, S. W. 1990. Damselflies of Florida, Bermuda and the Bahamas. Scientific Publishers, Gainesville, Florida. 148 pp.

Orr, R. L. 1995a. Odonata of Plummers Island. Argia 7(1): 6-10.

Orr, R. L. 1995b. (in preparation). Odonata of the Patuxent Wildlife Research Center, Anne Arundel and Prince Georges Counties, Maryland.

Roble, S. M. 1994. A preliminary checklist of the damselflies of Virginia, with notes on distribution and seasonality (Odonata: Zygoptera). Banisteria 4: 3-23.

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Deraeocoris manitou and *Plagiognathus albellus* (Heteroptera: Miridae): First Eastern U. S. Records

A. G. Wheeler, Jr.
Bureau of Plant Industry
Pennsylvania Department of Agriculture
Harrisburg, Pennsylvania 17110

Distributions for species in the largest family of true bugs, the Miridae or plant bugs, are generally poorly known. Range extensions of 500 or even 1,000 miles are not unexpected. Herein I give the first Virginia records of two mirids, *Deraeocoris manitou* and *Plagiognathus albellus*, neither of which has been previously recorded east of Missouri. Voucher specimens are deposited in the National Museum of Natural History, Washington, D.C.

Deraeocoris manitou (Van Duzee)

Described from Manitou, Colorado, without ecological information (Van Duzee, 1920), this plant bug has since been reported only from three additional states: Arizona, Missouri, and New Mexico (Knight, 1921; Henry & Wheeler, 1988). The host plant is red cedar (*Juniperus virginiana*) (Froeschner, 1949; Blinn & Yonke, 1985). *Deraeocoris manitou* was collected at two localities in Virginia (Fig. 1): Montgomery Co., Virginia Polytechnic Institute & State University campus, Blacksburg, 4 June 1989 (adults); 15 & 29 May 1995 (nymphs only); Roanoke Co., Hollins College campus, Hollins, 25 May 1985 (5th instars, adults); 6 May 1995 (nymph only).

Like other members of the genus (Knight, 1921), *D. manitou* probably is predacious. In Virginia it was always collected with the aphid *Cinara* sp. on branches of large red cedars in landscape plantings. Attempts to collect this mirid elsewhere in the state were unsuccessful. My limited observations indicate that overwintered eggs of this univoltine bug begin to hatch in early May and adults appear in late May.

Despite extensive collecting on *Juniperus* spp. in the eastern states (Wheeler & Henry, 1977; A.G.W., unpublished data), *D. manitou* has been found at only one other locality (new state record): TENNESSEE: Rutherford Co., Middle Tennessee State University campus, Murfreesboro, 28 May 1985, on *J. virginiana*, T. J. Henry & A.G.W. An additional western collection was made in Texas (new state record): Brazos Co., Texas A & M University campus, College Station, on *Juniperus* sp. (*scopulorum* or *virginiana*), T.J. Henry & A.G.W.

Figure 1. Distribution of *Deraeocoris manitou* showing new records (circles) and previous easternmost U. S. record (star).

Plagiognathus albellus Knight

This species was described on the basis of three specimens collected at St. Louis, Missouri, in June 1944 (Knight, 1953). No additional collections of *P. albellus* have been reported (Henry & Wheeler, 1988), and its host plant has remained unknown.

This phytophagous mirid can now be recorded from one site in Virginia (Fig. 2): Albemarle Co., University of Virginia campus, Charlottesville, 23 May 1986 and 29 May 1995, on *Platanus* sp. (*occidentalis* or *P.* x *acerifolia*). Adults were common on sycamore or London plane in both years and co-occurred with *Plagiognathus albatus*, the sycamore plant bug, whose seasonal history and habits have been studied (Wheeler, 1980).

The only other known collection of this apparent *Platanus* specialist is from Texas (new state record): Jackson Co., Rt. 35 1.6 km S. of Rt. 172, NE. of Point Comfort, 25 Apr. 1983, T. J. Henry & A.G.W.

Figure 2. Distribution of *Plagiognathus albellus* showing new record (circle) and previous easternmost U. S. record (star).

Discussion

Extensive fieldwork in the eastern United States since the early 1970s suggests that *D. manitou* and *P. albellus* are uncommon and patchily distributed species. They were collected only on college campuses in the East rather than in natural communities, but both plant bugs are probably indigenous in eastern North America. Because their host plants–red cedar and sycamore or London plane, respectively–move in the horticultural trade, it is possible that one or both species have been introduced with nursery stock originating in the western states. Additional collections of these little-known plant bugs should help interpret their disjunct distributions in the eastern United States.

Acknowledgments

I thank T. J. Henry (Systematic Entomology Laboratory, USDA, c/o National Museum of Natural History, Washington, D.C.) for companionship in the field and his review of the manuscript.

Literature Cited

Blinn, R. L., & T. R. Yonke. 1985. An annotated list of the Miridae of Missouri (Hemiptera: Heteroptera). Transactions of the Missouri Academy of Science 19: 73-98.

Froeschner, R. C. 1949. Contributions to a synopsis of the Hemiptera of Missouri, Pt. IV. Hebridae, Mesoveliidae, Cimicidae, Anthocoridae, Cryptostemmatidae, Isometopidae, Miridae. American Midland Naturalist 42: 123-188.

Henry, T. J., & A. G. Wheeler, Jr. 1988. Family Miridae Hahn, 1833 (=Capsidae Burmeister, 1835). The plant bugs. Pp. 251-507 *In* T. J. Henry & R. C. Froeschner (eds.), Catalog of the Heteroptera, or True Bugs, of Canada and the Continental United States. E. J. Brill, Leiden.

Knight, H. H. 1921. Monograph of the North American species of *Deraeocoris* (Heteroptera, Miridae). Pp. 75-210 *In* 18th Report of the State Entomologist of Minnesota. Minnesota Agricultural Experiment Station, St. Paul.

Knight, H. H. 1953. New species of Miridae from Missouri (Hemiptera). Iowa State College Journal of Science 27: 509-518.

Van Duzee, E. P. 1920. New hemipterous insects of the genera *Aradus*, *Phytocoris* and *Camptobrochys*. Proceedings of the California Academy of Sciences (4) 9: 331-356.

Wheeler, A. G., Jr. 1980. Life history of *Plagiognathus albatus* (Hemiptera: Miridae), with a description of the fifth instar. Annals of the Entomological Society of America 73: 354-356.

Wheeler, A. G., Jr., & T. J. Henry. 1977. Miridae associated with Pennsylvania conifers 1. Species on arborvitae, false cypress, and juniper. Transactions of the American Entomological Society 103: 623-656.

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The Type Locality of *Lithobius latzelii* Meinert (Chilopoda: Lithobiomorpha: Lithobiidae)

Richard L. Hoffman
Virginia Museum of Natural History
Martinsville, Virginia 24112

Many new species of American centipeds were described by Frederik Meinert in his classic paper "Myriapoda Musei Cantabrigensis" (1885) which was based upon material in the Museum of Comparative Zoology at Harvard University. Among them *Lithobius Latzelii*, the holotype of which was labeled "Virginia: Crandall." As will be explained here, the name was born with an unsuspected handicap that can only more than a century later be identified and treated.

In 1887, the species was reported by Charles H. Bollman from Chapel Hill, North Carolina, without reference to the depository of the specimens, although perhaps they were in his personal collection along with other Chapel Hill myriapod material received from G. F. Atkinson. Since Bollman provided a key to eight species of the subgenus *Neolithobius*, in which Meinert's characters diagnostic of *latzelii* were used, there seems no reason to doubt his identification. A year later (1888) Bollman recorded the species from Marksville and Luray, Virginia, on the basis of specimens in the U. S. National Museum collected by Lucien M. Underwood.

In his first paper on the lithobiomorph fauna of southeastern United States, R. V. Chamberlin (1911) combined the three names *latzelii* Meinert 1885, *clarus* McNeill 1887, and *tyrannus* Bollman 1887, under the older name *vorax* Meinert, 1872. This action was justified by his discovery that the various characters upon which the three younger names were based could be found also in specimens of *vorax*.

Shortly thereafter, Chamberlin returned to the subject in his scholarly revision of North American lithobiids (1912 *et seq.*, the part treating *Neolithobius* published in 1925). On the basis of different character systems (notably spurulation of the podomeres), Chamberlin was able to ressurect both *tyrannus* and *latzelii* from synonymy with *vorax*. In the account of *latzelii*, he specified (using the conventional symbol "!") having examined specimens from Crandall, Virginia and Brown's Summit and Chapel Hill, North Carolina, and appended Bollman's records for Luray and Marksville, Virginia. Here the matter has stood

unchanged for almost 70 years. Despite this relatively short and uncomplicated history, the status of *latzelii* is not as well secured as one might wish. The localities Luray and Marksville seem out of place in context of the entire generic range. More importantly, the ostensible type locality "Crandall" appears to be false: there is currently no such place known in Virginia, and no evidence that the name was ever in use for any place in the Commonwealth, suggesting a mislabeling which might even remove the species from the local biota.

In May, 1994, by a statistically improbable stroke of serendipity, I happened to notice a reference to an A. R. Crandall who, at some time prior to 1871, collected freshwater fishes in Virginia for the Museum of Comparative Zoology. This coincidence was too great to dismiss, so a computer print-out of Crandall's specimens was obtained from the Department of Ichthyology at the MCZ. From this information, albeit somewhat fragmentary, one learns that Crandall collected chiefly in the upper Tennessee River system of northeastern Tennessee and southwestern Virginia. The localities "North Fork Holston" and "Emery College" (the former name of Emory & Henry College, in Washington County) are specified for Virginia. Can there be much doubt that the Meinert's "locality" name came from a temporary field label attached to specimens other than fishes which Crandall picked up, and that the type locality of *latzelii* is in all liklihood somewhere in Washington or Smyth counties, Virginia?

Specimens identified by comparison with the holotype have been recorded from only two localities: Chapel Hill (Orange Co.) and Brown's Summit (Guilford Co.), North Carolina. Chamberlin (1925) made it clear (with the symbol "!") that he had seen material from both, in fact he had personally obtained the centipeds from Brown's Summit in 1910. By the time he revised *Neolithobius* (sometime around 1912-1914), Chamberlin's discrimination of lithobiid species was so finely honed that a mistake in identification is most unlikely. He did not see the specimens from Marksville and Luray, Virginia, nor do I know where they are at present (if extant at all). Since these places are so far removed from Piedmont North Carolina, it is reasonable to suspect that if the specimens were in fact correctly identified, they may have been mislabeled. Substance is given this possibility in a statement from Dr. R. M. Shelley that he has seen material of *Hemiscolopendra punctiventris* (Newport) also labeled as coming from Luray, collected by Underwood (USNM collection). This austral species is known with some assurrance to occur in Virginia only south of the James River (Hoffman, 1994), and almost certainly does not occur anywhere near Luray.

This leaves the question, is fixation of a restricted type locality in southwestern Virginia biogeographically plausible in light of a known range in the North Carolina Piedmont? Fortunately, unpublished information provides affirmation. The personal centiped collection of the late Dr. Crabill, presently on deposit at the National Museum of Natural History, contains specimens (REC 2144) from Blacksburg, Montgomery Co., Va., collected by Dr. Crabill and me on 11 October 1956 (and if memory serves correctly, from dry open habitats). Blacksburg is only 110 km northeast of, and in the same physiographic region with, Emory, Washington Co., Virginia, which is provisionally suggested as the restricted type locality for *Lithobius latzelii* Meinert. Future field work in that region can confirm whether or not the species presently occurs there. There is supporting parallel evidence from milliped distributions: the small parajulid *Aniulus orientalis* Causey is known from Blacksburg as well as central North Carolina, and the distribution of the xystodesmid *Sigmoria latior* (Brolemann) encompasses much of Piedmont North Carolina, as well as southwestern Virginia (Shelley, 1981, Fig. 139)

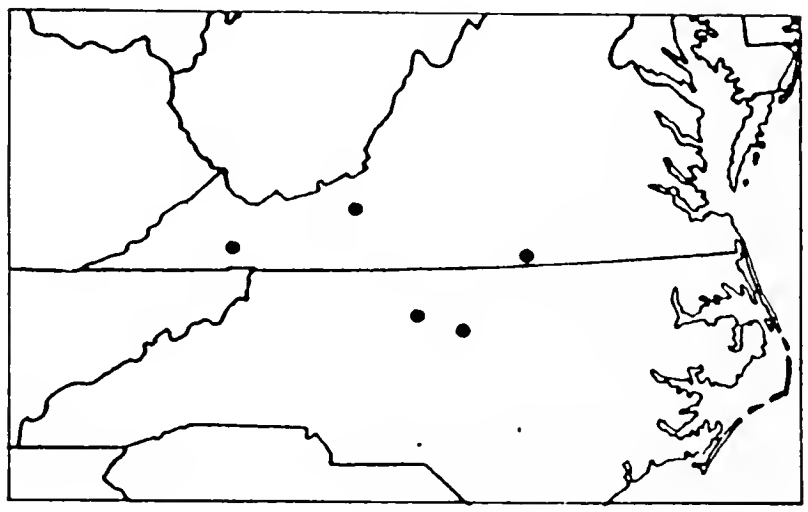

Figure 1. Virginia and North Carolina showing known localities for *Neolithobius latzelii*.

In any event, all of the localities considered reliable for the species are shown on the map (Figure 1). Aside from places mentioned in the preceding text, VMNH has three specimens of *latzelii* captured in pitfalls at Elm Hill State Game Management Area, Mecklenburg Co., Virginia, 15 March-22 April 1991. Eventually more material of the species will be collected, providing better knowledge of its range and possible confirmation for the present selection of a restricted type locality.

Acknowledgements

Appreciation is expressed to Laura Leibensperger, Department of Invertebrates, Museum of Comparative Zoology, for her invaluable aid in providing documentation from MCZ records; to Dr. Jonathan Coddington for access to the Crabill collection of centipeds now under his charge; and Dr. Rowland M. Shelley for reviewing an early draft of this paper in manuscript.

Literature Cited

Bollman, C. H. 1887. Descriptions of fourteen new species of North American myriapods. Proceedings of the United States National Museum 10: 617-627.

Bollman, C. H. 1888. Notes upon some myriapods belonging to the U. S. National Museum. Proceedings of the United States National Museum 11: 343-350.

Chamberlin, R. V. 1925. The genera *Lithobius*, *Neolithobius*, *Gonibius*, and *Zinapolys* in America north of Mexico. Bulletin of the Museum of Comparative Zoölogy at Harvard College 52(8): 441-504.

Hoffman, R. L. 1994. The occurrence of *Hemiscolopendra punctiventris* (Newport), an ecophilous centiped, in Virginia (Chilopoda: Scolopendromorpha). Banisteria 4: 33-34.

Meinert, F. 1885. Myriapoda Musei Cantabrigensis. Part 1. Chilopoda. Proceedings of the American Philosophical Society 21: 161-233.

Shelley, R. M. 1981. Revision of the milliped genus *Sigmoria*. Memoirs of the American Entomological Society 33: 1-140.

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Abnormal Coloration in a Common Snapping Turtle (*Chelydra serpentina serpentina*) from Virginia

Joseph C. Mitchell
Department of Biology and School of Continuing Studies
University of Richmond
Richmond, Virginia 23173

Abnormally colored and patterned reptiles are occasionally discovered in wild populations. These individuals have received considerable attention and descriptions of them often appear in the herpetological literature (Hensley, 1959; Dyrkacz, 1981). Abnormal colors range from complete albinism to complete melanism. Albinism is a congenital decrease or absence of melanin in the skin, eyes, and mucosa resulting

apparently from a genetic defect in melanin metabolism, whereas melanism is an unusual darkening of normal pigmentation due to increased melanin production (Bechtel, 1995). Albinistic pintos possess small, scattered areas of normal pigment but the eyes lack pigment (Dyrkacz, 1981). Leucistic reptiles have no functional melanophores, xanthophores, very few iridophores, and the eye is usually normally pigmented (Dyrkacz, 1981; Bechtel, 1995). Very few records of such abnormalities have been published for reptiles in Virginia. Mitchell (1994b) listed all known albinistic and melanistic snakes and described a xanthic northern water snake (*Nerodia sipedon sipedon*) from Virginia. Mitchell (1994a) reported no instances of abnormally pigmented turtles or lizards from the state.

On 28 June 1991 a common snapping turtle (*Chelydra serpentina serpentina*) lacking most of the normal dark pigmentation was discovered in Great Neck Lake, Virginia Beach, Virginia by M. Woodhouse. The turtle was a young female and measured 217 mm straightline carapace length, 165 mm plastron length, and 2365 g body mass at capture. The number of carapacial annuli indicated an age of 5-6 years. The plastron length exceeded that for the smallest known mature female (155 mm) from Virginia (Mitchell, 1994a), suggesting that she was reproductively mature.

Normal skin coloration in snapping turtles in Virginia varies from brown to black and shell color is typically brown with black streaks (Mitchell, 1994a). The skin on all soft parts of the body of this specimen was pink, except for the dorsum of the head, which was partially covered with light brown pigment. The lateral portions of the head and the iris of the eye were cream in color. The pupil was normally pigmented. The plastron was light tan with large areas of cream along all scute margins, and the carapace was a light brownish-cream with distinct black borders along the margins of all carapacial scutes. This specimen may thus be categorized as an albinistic pinto but with normally pigmented eyes.

The turtle remained on display at the Virginia Marine Science Museum from its capture in 1991 to late 1994. It shared the coastal river aquarium with two normally pigmented adults, all of which interacted and behaved similarily. Its deposition is unknown.

This is the first record of a partially albinistic *C. serpentina* from Virginia (Mitchell, 1994a). Dyrkacz (1981) reported albinistic snapping turtles from Florida, Illinois, Kentucky, Ohio, and Ontario, Canada. A completely albinistic adult with pink eyes from an unknown location is illustrated in color in Bechtel (1995).

Acknowledgments

I thank Thomas D. Pitchford, formerly of the Marine Science Museum in Virginia Beach, for bringing this turtle to my attention and for taking the measurements.

Literature Cited

Bechtel, H. B. 1995. Reptile and amphibian variants, colors, patterns, and scales. Krieger Publishing Company, Malabar, FL. 206 pp.

Dyrkacz, S. 1981. Recent instances of albinism in North American amphibians and reptiles. Society for the Study of Amphibians and Reptiles, Herpetological Circular 11:1-31.

Hensley, M. 1959. Albinism in North American amphibians and reptiles. Publications of the Museum of Michigan State University, Biological Series 1:133-159.

Mitchell, J.C. 1994a. The Reptiles of Virginia. Smithsonian Institution Press, Washington, D.C., 352 pp.

Mitchell, J. C. 1994b. An unusually colored northern water snake (*Nerodia sipedon sipedon*) from Giles County, Virginia. Banisteria 4:32-33.

Banisteria, Number 6, 1995

Miscellanea

Book Reviews

Finding Wildflowers in the Washington-Baltimore Area, by Cristol Fleming, Marion Blois Lobstein, and Barbara Tufty. 1995. The Johns Hopkins University Press, Baltimore, MD. xiii + 312 pages. $15.00 + shipping. Available from The Johns Hopkins Press, 2715 North Charles Street, Baltimore, MD 21218-4319.

As Stanwyn G. Shetler, Curator of Botany at the Smithsonian Institution, states in the foreword to *FindingWildflowers in the Washington-Baltimore Area*, this is not a book for identifying wildflowers but 'an enticing invitation" to enjoy finding wildflowers that one already knows or wishes to become familiar with in a geographical region that is growing in population and perhaps is becoming environmentally fragmented. There are, however, 122 places that remain in the Washington-Baltimore area described by the authors that are available for fine botanizing. Three chapters, of the seven chapters devoted to "Places," describe Virginia sites where showier herbaceous species can be found that are native or naturalized to the region. These Virginia places are the Piedmont, the Coastal Plain, and the Mountains, the first two with county designations and the latter with sections on the Blue Ridge, the Shenandoah Valley, and "Ridge and Valley."

The "Places" section provides directions to the site and other helpful information, such as the telephone number of a visitor center, in addition to particular species of interest at the site, for each of the 122 place entries. The material in this section is presented in a style that suggests that the author is standing with you viewing the scene and noting interesting biological data. For example, in the description for Turkey Run Park of the Potomac Palisades on page 161, this piece of information is included: "While you are enjoying the beauty of the wildflowers, you might like to taste the leaves of ramps *(Allium tricoccum)* ... Considered a spring tonic, this relative of garlic has a strong smell that remains with the eater for a long time." Close by this entry, on page 163, in the account of the wildflowers at Scott's Run Nature Preserve, information for the more hardcore botanist is included: "In a survey done several years ago, 175 species of flowering plants were found in bloom between March and June, and over 20 species of ferns were identified."

In addition to the "Places," which is the great middle section, there are two other sections that make this a valuable resource both to the botanist or to the casual hiker out to botanize for even the first time. The first section "The Settings" describes the geology, the climate, and the varying habitats of the region. There is enough information in this section to introduce one to the area, and particularly helpful is the sampling of wildflower species that might commonly be found in the habitats that are described. As a botanist who is interested in habitats that have been influenced by human activity, I am particularly pleased that habitats such as fields, meadows, and rights-of-way are described. Descriptions of more specialized (and we hope less disturbed) habitats are also included, such as rock outcrops and serpentine barrens.

The final section of the three is "The Species." "Monocotyledons" and "Dicotyledons" are each chapters in which the over 730 species mentioned in the site descriptions are listed alphabetically within an alphabetical listing of families. Each species entry includes scientific name, common name, flowering time, habitat, and information concerning how widespread and how common the species is.

Making the book complete are several helpful regional maps, a sprinkling of line drawings of familiar wildflowers, and three appendices: one concerning new scientific names, one a calendar of blooming dates for the species included, and one a listing of organizations associated with wildflower surveys and information, with addresses and telephone numbers.

Overall, this is a book for the wildflower lover and

even casual nature observer, and, I believe, for any Virginian interested in the state's natural history. I plan to keep this paperback volume in my car as a reference although I do not live in the immediate Washington-Baltimore area. It would be wonderful to have such references for all wildlife and for other regions of our state. Shetler concludes his foreword of *Finding Wildflowers in the Washington-Baltimore Area* with this remark: "Whether you are a serious plant 'lister' or simply one who wants to get the most out of hiking, this book is for you."

Anne C. Lund
Biology Department
Hampden-Sydney College
Hampden-Sydney, VA 23943

Butterflies of Delmarva, by Elton N. Woodbury. 1994. Tidewater Publishers, Centreville, Maryland, in association with the Delaware Nature Society, Inc. xxii + 138 pp. Softcover. $12.95 plus applicable UPS shipping charge. Available from Tidewater Publishers, P. O. Box 456, Centreville, MD 21617 (phone 1-800-638-7641).

This pocket-sized field guide represents four decades of observations and photography by the author. It discusses 64 species (including 7 strays) of butterflies known from the Delmarva Peninsula, which is the area that encompasses all of Delaware, the eastern third of Maryland and Accomack and Northampton counties on Virginia's Eastern Shore. Skippers are not treated in the book, presumably because they are difficult for most people to identify; consequently, they are perhaps perceived to be of less intrinsic interest to laymen.

An introductory chapter very briefly discusses taxonomy, butterfly anatomy, life history and ecology, and the major habitats of the Delmarva Peninsula. Although minimal information is provided on these topics, it may suffice for many readers of this book. The introduction is followed by individual species accounts, short discussions of butterfly gardening and photography, two appendices (plant names and butterfly checklist), a brief bibliography and separate indexes for butterflies and plants. Brief family accounts precede the appropriate species accounts. Each species account is typically one page in length and contains concise information under subheadings entitled Butterfly (discusses identification and similar species), Range, Habitat, Adult Food Sources and Immature Stages. Unfortunately, no data are presented on typical or extreme flight dates of Delmarva populations, although the number of annual broods is reported. Readers expecting to find range maps of the various species at either the regional (e.g., county records) or North American level will be very disappointed. The only map in the entire book is a county outline map of the Delmarva region. Furthermore, the range descriptions in the species accounts do not provide county-specific data for the Delmarva Peninsula. The inclusion of Klots (1951) rather than its worthy successor (Opler, 1992) in the bibliography is puzzling.

Thirty-two unnumbered pages in the center of the book contain 132 mostly excellent color photographs, all of which were taken by the author. They depict the adults of all regularly occurring species (and 4 strays) treated in the text except for King's Hairstreak, which is very rare in this region. Both dorsal and ventral views of the wings are provided for several species. Separate photographs of males and females are included for some sexually dimorphic species. The common and scientific names of each species appear adjacent to the photographs, but occupy more than a third of the page width. At four to a page, this renders the photographs quite small (ca. 4.5 cm x 7 cm). Thus, they are comparable in size to those in Glassberg (1993), but smaller than those in Pyle (1981). There are also (even smaller) photographs of the eggs of two species (Black Swallowtail and Monarch), the larvae (caterpillars) of 17 species and the pupae (chrysalises) of 19 species. Many butterfly enthusiasts will welcome the inclusion of these larval and pupal photographs because they are often lacking or minimal in other butterfly books.

The binding of this book is stiff, rendering it somewhat difficult to open. I am not sure if it will hold up to the heavy use to which field guides are typically subjected. The writing style is concise and matter-of-fact. The author rarely reveals which observations are his own versus those that he has gleaned from the literature. The text contains several typographical errors, including transposition of the last two letters of the superfamily names Hesperioidea and Papilionoidea and insertion of an extra "i" in the scientific name for northern prickly

ash (it should be *Zanthoxylum americanum*). Also, Lamiaceae has replaced Labiatae as the currently accepted family name for mints (Gleason & Cronquist, 1991).

By my count, the author failed to mention three butterflies that have been reported from the Delmarva Peninsula. The Diana (*Speyeria diana*) butterfly formerly inhabited Northampton County, Virginia (Clark & Clark, 1951; West & Opler, 1979). The extirpation of this large, strikingly dimorphic (males are black and orange, females are black and blue) fritillary species from this and numerous other counties in southeastern Virginia was probably due to deforestation (Clark & Clark, 1951; West & Opler, 1979). The other species not discussed in the book are the very similar Pearly Eye (*Enodia portlandia*) and Creole Pearly Eye (*E. creola*). The former species has been reported from both of the Virginia counties within the Delmarva region, whereas the latter has been reported from Sussex County, Delaware (Opler 1983, 1992; it should be noted that Opler & Krizek [1984] did not include these records). However, switch cane (*Arundinaria gigantea* ssp. *tecta*), the larval foodplant of both species, does not occur in Delaware or on Virginia's Eastern Shore (Gleason & Cronquist, 1991; Harvill et al., 1992; Tatnall, 1946). Therefore, both of these butterflies are either very rare strays to this region or the reports are erroneous. Unfortunately, the latter possibility cannot be entirely discounted because I have learned that the original source of all three county records is a single amateur lepidopterist. To the best of my knowledge, this individual has not produced supporting photographs or voucher specimens for any of these records. The author may have been aware of this and considered the reports unreliable; consequently they were omitted from the discussion of stray species. Regardless of whether or not these reports are based on misidentifications, the northeastern range limit of resident populations of both species is the mainland portion of southeastern Virginia. Therefore, I conclude that the omission from this book of all three species discussed above will not affect anyone attempting to identify a butterfly that they encounter on the Delmarva Peninsula.

I believe that the author has largely succeeded in meeting the primary objective of his book, which was "to provide a reliable and easy means of identifying butterfly species ... of the Delmarva Peninsula." It is appropriate for either beginning or advanced amateur naturalists. The lack of significant new information will limit its use by professionals. I recommend this book to anyone with a special interest in the butterfly fauna of this area. For the pictures alone, it is worth the price. However, for those who desire treatment of a broader geographic area (and consequently more species) or the inclusion of skippers, I recommend that they first consider the excellent field guides by Glassberg (1993), Opler (1992) and Pyle (1981).

Before ending this review, I would like to challenge one or more competent amateur or professional lepidopterists to initiate the preparation of an updated text on the butterfly and skipper fauna of Virginia. Nearly half a century has passed since the last summary was prepared (Clark & Clark, 1951). Not only is this work long out of print, but many exciting new discoveries have been made regarding the state's fauna since then. The phenomenal success that the fledgling Butterfly Society of Virginia (formed in 1992) has enjoyed in attracting new members (several hundred to date), not to mention its recent successful efforts to obtain approval for the production of a butterfly license plate by the Virginia Department of Motor Vehicles, attests to the great interest that the general public has in this group of insects. By the end of the century, I hope to see a new book on the Virginia fauna that is comparable to those currently available for several other states (e.g., Iftner et al., 1992).

Literature Cited

Clark, A. H. & L. F. Clark. 1951. The Butterflies of Virginia. Smithsonian Miscellaneous Collections 116(7): 1-239.

Glassberg, J. 1993. Butterflies Through Binoculars: A Field Guide to Butterflies in the Boston-New York-Washington Region. Oxford University Press, New York. 160 pp.

Gleason, H. A. & A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. Second Edition. The New York Botanical Garden, Bronx, NY. 910 pp.

Harvill, A. M., Jr., T. R. Bradley, C. E. Stevens, T. F. Wieboldt, D. M. E. Ware, D. W. Ogle, G. W. Ramsey &

G. P. Fleming. 1992. Atlas of the Virginia Flora. Third Edition. Virginia Botanical Associates, Burkeville, VA. 144 pp.

Iftner, D. C., J. A. Shuey & J. V. Calhoun. 1992. Butterflies and Skippers of Ohio. Ohio Biological Survey, Volume IX (New Series), Number 1.

Klots, A. B. 1951. A Field Guide to the Butterflies of North America, East of the Great Plains. Houghton Mifflin Company, Boston. 349 pp.

Opler, P. A. 1983. County Atlas of Eastern United States Butterflies (1840-1982). Privately printed.

Opler, P. A. 1992. A Field Guide to Eastern Butterflies. Houghton Mifflin Company, Boston. 396 pp.

Opler, P. A. & G. O. Krizek. 1984. Butterflies East of the Great Plains. Johns Hopkins University Press, Baltimore. 294 pp.

Pyle, R. M. 1981. The Audubon Society Field Guide to North American Butterflies. Alfred A. Knopf, New York. 924 pp.

Tatnall, R. R. 1946. Flora of Delaware and the Eastern Shore. The Society of Natural History of Delaware. 313 pp.

West, D. A. & P. A. Opler. 1979. Diana Fritillary. Pp. 172-173 *in* D. W. Linzey (ed.). Proceedings of the Symposium on Endangered and Threatened Plants and Animals of Virginia. Center for Environmental Studies, Virginia Polytechnic Institute and State University, Blacksburg, VA.

Steven M. Roble
Virginia Department of Conservation and Recreation
Division of Natural Heritage
1500 E. Main Street, Suite 312
Richmond, VA 23219

Amphibians and Reptiles of Assateague and Chincoteague Islands, by Joseph C. Mitchell and John M. Anderson. 1994. Virginia Museum of Natural History, Special Publication Number 2. viii + 120 pages. Softcover. $14.95 plus $1.50 shipping and handling for first book, $0.75 for each additional book. Available from Publications Department, Virginia Museum of Natural History, 1001 Douglas Avenue, Martinsville, VA 24112.

The beaches, dunes, marshes and surf of the islands of Assateague and Chincoteague attract millions of tourists, horse enthusiasts, fishermen and naturalists (particularly birdwatchers) annually. Most of this land is preserved as Chincoteague National Wildlife Refuge, Assateague Island National Seashore and Assateague State Park (Maryland). The authors of this book have attempted to fill a void in the popular natural history literature of the islands by preparing this treatise on the native herpetofauna. Presumably, the Virginia Museum of Natural History recognized the vast potential market for this book before agreeing to publish it. The text treats the seven species of amphibians and eighteen species of reptiles that are known from these islands. Several of these species have been found on either or both islands only once or twice. The book includes a review of all previously published data, some unpublished observations of other biologists and several years of recent study by the authors.

The book is printed on recycled paper and has a flexible cover and sturdy binding. The pages are relatively thick, but my copy has partial diagonal creases on six consecutive pages. The text is easy to read, well written and is relatively free of typographical or grammatical errors (I found about ten). The writing is factually sound and appropriate for amateur naturalists with little or no formal training in biology. One minor error is that the Atlantic Coast populations of the piping plover (correct spelling of its scientific name is *Charadrius melodus*) is federally threatened rather than endangered (the latter status applies only to inland populations).

The introductory chapter contains good discussions of why these islands are inhabited by so few amphibians and reptiles, the history of herpetological surveys on the islands and the physical characteristics and natural habitats of the islands. There is also a brief discussion of some of the other vertebrate species found on Assateague and Chincoteague Islands. This is followed by a checklist of the amphibians and reptiles recorded

from these islands, technical keys for species identification, individual species accounts, brief discussions of problematic species, zoogeography, conservation and management, and hints on observing amphibians and reptiles. There are also two bibliographies (general and specific references), a glossary, personal checklist page and an index. Each species account contains information under subheadings entitled Description, Eggs and Larvae (frogs and toads only), Sexual Dimorphism, Distribution, Habitat, Reproduction, Predators and Prey, and Remarks.

There are 27 color plates spanning eight pages which depict three habitats, all seven amphibians and 16 of the 18 reptiles treated in the text. Photographs are lacking for two sea turtles which rarely visit the islands. The photographs are mostly of fair to good quality. Some of them portray less than ideal poses of the subject animals (e.g., several turtles are partially retracted into their shells) or show only limited portions of the entire body (plate 25); others suffer from slight over or underexposure problems (plates 9, 26), heavy shadows (plate 12) and inadequate cropping (plates 5, 6, 10 and 27). The overlapping of two plates (10-11 and 26-27) was somewhat displeasing to my eyes and easily could have been avoided by more extensive cropping of one member of each pair. One of the best photographs (a northern diamondback terrapin by David Liebman) also appears on the cover of the book. Despite these criticisms, with the exception of several snakes, the photographs should be adequate to allow most novices to identify the herpetofauna of the islands.

The dichotomous key for species identification does not include eggs or tadpoles, but can be used to identify young snakes of several species (e.g., northern black racer) which differ considerably in color pattern from the adults. Portions of the key may be a bit too technical for some readers. The inclusion of several useful line drawings and a glossary of mostly technical terms should alleviate most problems that novices will initially encounter when attempting to use the keys. Although the generalized frog and toad drawings are partly labelled, three of the four terms do not appear in the key, and the fourth (vertebral stripe) appears in the key under a different name (middorsal stripe). Also, the term "snout-vent length" is replaced by "total body length" in the frog species accounts despite its illustration. The former term appears only in the glossary and fence lizard species account. Several additional line drawings that might have been helpful for some novices include keeled versus smooth snake scales, a lateral view of the upturned snout of hognose snakes (versus the rounded snout of other snakes), and the plastron of mud turtles (showing its shape and hinges). Phrases in the couplets such as "hind limbs elephant-like" and "body uniform" may not be obvious to many readers. Other terms that were used in the keys or appear elsewhere in the text that possibly should have been added to the glossary include bridge, circumtropical, cross section and trunk. The definition that is provided for phenotype may not sufficiently explain this term for some readers.

To their credit, the authors have attempted to include as much data specific to the populations on Assateague and Chincoteague islands as they could, rather than relying entirely on studies conducted elsewhere in each species' range. The discussion of the bullfrog mating system does not credit the original studies on which this information is based, nor does it note that some females produce multiple clutches. I was confused by the contrasting statements indicating that the only known location on the islands for this species was based on tadpoles, and then the subsequent statement that juveniles can be found in almost any terrestrial habitat on the southern end of Assateague Island. Perhaps the former statement refers specifically to breeding locations. The discussion of sexual dimorphism in the species accounts of the three ranid frogs does not mention the conspicuous swollen thumbs of breeding adult males.

The authors effectively convey their admiration for the two groups of animals covered by this book. They frequently stress the need for more information concerning the distribution, behavior and ecology of the amphibian and reptiles populations of these islands, because quite a few of the species are poorly known in this area. Hopefully, a few of their readers will contribute to our knowledge of the islands' herpetofauna by reporting observations on selected species as is requested by the authors. The discussion on conservation is very timely and appropriate, but the various management recommendations that are included seem out of place because they have little relevance to the typical reader of this book. Presumably,

these recommendations were also included in the technical research report that the authors submitted to the national seashore. Perhaps they concluded that many present or future managers of the national seashore and national wildlife refuge would be more inclined to read this book rather than dust off a copy of their report, and did not want these recommendations to go unnoticed.

The literature citations are very extensive and appear to be complete. However, the Assateague Island specimen record for eastern garter snake (*Thamnophis s. sirtalis*) that is plotted just north of the Maryland-Virginia state line in Harris (1975) is not discussed in the book, leading me to suspect that this species was inadvertently omitted (this record is also listed in Gibbons & Coker [1978] based on Lee [1972]). Although garter snakes have not been documented on any of the Virginia barrier islands (Conant et al., 1990), one was recently collected near a brackish marsh on the mainland end of the Wallops Island causeway (Hobson & Stevenson, 1995). This species is known to inhabit several barrier islands off the coasts of Florida, Georgia and South Carolina, as well as the vicinity of Nags Head, North Carolina (Blaney, 1971; Gibbons & Coker, 1978; Gibbons & Harrison, 1981; Palmer & Braswell, 1995).

The discussion of problematic species includes two reptiles (common musk turtle and broad-headed skink) recorded from Fenwick Island, the barrier peninsula north of Assateague Island (these areas were connected as recently as 1933). However, no mention is made of the gray treefrog (probably *Hyla chrysoscelis*, but *H. versicolor* is also possible based on data in Zweifel, 1970) record plotted in this same area by Harris (1975). Neither of these species inhabits brackish marshes like the green treefrog (*H. cinerea*) sometimes does. Gray treefrogs have not been documented on any of the Virginia barrier islands (Conant et al., 1990), but it is worth noting that they inhabit several barrier islands off the coasts of Georgia and North Carolina, as well as the vicinity of Nags Head (Braswell, 1988; Gibbons & Coker, 1978). Therefore, I would think it is remotely possible that gray treefrogs could occur on Assateague Island, albeit in low densities or a very localized area.

A recent report (Eckerlin, 1995) of a worm snake (*Carphophis amoenus*) that was transported to Chincoteague Island in a load of dirt which originated on the mainland illustrates the caution that must be exercised in evaluating the natural versus introduced status of island populations. The authors of this book were careful to evaluate each species accordingly and concluded that as many as three species (bullfrog, eastern painted turtle and red-bellied turtle) discussed in the text were introduced by man. They were unaware of this 1990 worm snake record; consequently, this species is not mentioned in the book.

Despite the above criticisms, some of which may be unduly picky (and others of which may be addressed in future editions), this is a very fine contribution to the natural history of Assateague and Chincoteague Islands. It should be of interest to many of the human visitors that flock to this area annually. I trust that the Virginia Museum of Natural History has already begun to aggressively market this publication in that area of the state, as well as appropriate places in Maryland, Delaware and elsewhere along the Atlantic Coast. I hope that this represents only the first of many high-quality books relevant to the natural history of Virginia that the museum will publish in the coming years.

Literature Cited

Blaney, R. M. 1971. An annotated check list and biogeographic analysis of the insular herpetofauna of the Apalachicola region, Florida. Herpetologica 27(4): 406-430.

Braswell, A. L. 1988. A survey of the amphibians and reptiles of Nags Head Woods Ecological Preserve. The ASB Bulletin 35: 199-217.

Conant, R., J. C. Mitchell & C. A. Pague. 1990. Herpetofauna of the Virginia Barrier Islands. Virginia Journal of Science 41(4A): 364-380.

Eckerlin, R. P. 1995. Field notes: *Carphophis amoenus* (Eastern worm snake). Catesbeiana 15(2): 47-48.

Gibbons, J. W. & J. W. Coker. 1978. Herpetofaunal colonization patterns of Atlantic Coast barrier islands. American Midland Naturalist 99(1): 219-233.

Gibbons, J. W. & J. R. Harrison, III. 1981. Reptiles and amphibians of Kiawah and Capers Islands, South Carolina. Brimleyana 5: 145-162.

Harris, H. S., Jr. 1975. Distributional survey (Amphibia/Reptilia): Maryland and the District of Columbia. Bulletin of the Maryland Herpetological Society 11(3): 73-167.

Hobson, C. S. & D. J. Stevenson. 1995. Field notes: *Thamnophus sirtalis sirtalis* (Eastern garter snake). Catesbeiana 15(1): 23.

Lee, D. S. 1972. List of the amphibians and reptiles of Assateague Island. Bulletin of the Maryland Herpetological Society 8(4): 90-95.

Palmer, W. M. & A. L. Braswell. 1995. Reptiles of North Carolina. University of North Carolina Press, Chapel Hill. 412 pp.

Zweifel, R. G. 1970. Distribution and mating call of the treefrog, *Hyla chrysoscelis*, at the northeastern edge of its range. Chesapeake Science 11(2): 94-97.

Steven M. Roble
Virginia Department of Conservation and Recreation
Division of Natural Heritage
1500 E. Main Street, Suite 312
Richmond, VA 23219

Reports

1. Proceedings of the Second Annual Meeting of the Virginia Natural History Society

The second annual meeting of the VNHS was held on 25 May 1995 at Virginia Military Institute, Lexington, VA as a section of the Virginia Academy of Science entitled "Natural History and Biodiversity." The following talks were presented:

Old-growth forests in the mid-Appalachians. Steven L. Stephenson and Harold S. Adams.

Old growth forests of Peters Mountain, Alleghany County, Virginia. William H. Moorhead III.

Trojan horses in Appalachian forests: where have all the trees gone? R. Jay Stipes.

Recent exotic insect introductions of economic importance: 1895-1995. Eric R. Day.

Carabid beetle biodiversity in contrasting habitats in northern Virginia. Ardrienne A. Hall and Joseph C. Mitchell.

Chemosensory abilities of female freshwater mussels (Unionidae). William Henley and Richard J. Neves.

Rearing juvenile freshwater mussels (Unionidae) in artificial streams. Braven B. Beaty and Richard J. Neves.

The Southern Watersheds Common Reed Project: management of an invasive plant. Kennedy H. Clark.

Videotaping fishes from above the surface of the water. Eugene G. Maurakis.

Fish distribution in Russel Fork, Virginia, above and below a hydrological barrier. Kevin V. Leftwich, William E. Ensign, and Paul L. Angermeier.

Ecology of scale insects in Virginia. Michael Kosztarab.

Insects of moss phlox (*Phlox subulata*): unexpected diversity in Appalachian shale barrens. Alfred G. Wheeler, Jr.

Discovery of shale barrens in the Blue Ridge Mountains of west-central Virginia. Thomas J. Rawinski, Edith Beck, and Kennedy Hickman.

Fire history of the George Washington National Forest. Harold S. Adams and Steven Q. Croy.

Reconnaissance vegetation study of four river gorges in West Virginia. Ronald H. Fortney, Steven L. Stevenson, and Harold S. Adams.

Systematics of the spider genera *Mallos* and *Mexitilia* (Araneae: Dictynidae). Jason E. Bond.

Salamander density and diversity in the mountains of

southwest Virginia. Douglas N. Harpole and Carola A. Haas.

Reliability and efficiency of morphological indices of salamander nutritional conditions. Kevin L.S. Drury, Douglas N. Harpole, and Carola A. Haas.

Low nesting productivity of a Neotropical migrant songbird in an extensive forest landscape.

The following paper was presented as a poster:

Biodiversity of ant species in the Virginia Coast Reserve on the Eastern Shore of Virginia. Deborah A. Waller and John March.

Information on future meetings may be obtained from the Section Secretary (and VNHS Vice-President) Dr. Thomas J. Rawinski, Division of Natural Heritage, 1500 E. Main St., Suite 312, Richmond, VA 23219 (804-786-7951). Information about the 1996 meeting to be held in May at Virginia Commonwealth University in Richmond may be obtained from the Virginia Academy of Science, c/o Science Museum of Virginia, 2500 West Broad St., Richmond, VA 23220. Please make plans to attend.

2. Report of the President

As the new President of the Virginia Natural History Society, I hope to continue the significant progress that our society has made in its first two years under the outstanding leadership of Dr. Michael Kosztarab. As reported above, our second annual meeting at VMI with the Virginia Academy of Science was very successful. Our session was very well attended and a diverse array of papers was presented by our members. Tom Rawinski, our Vice President, is to be commended for his work in putting together this excellent program. Our **Banisteria** co-editors, Joseph C. Mitchell and Richard L. Hoffman, continue their success in producing an excellent journal for our society. I think the main challenge for the VNHS is to increase our membership. In order to do this, we need each member to spread the word about our society and to work to actively recruit a new member or two. There should be many potential members in and around the state, particularly among the graduate and undergraduate students in colleges and universities, public school teachers, amateur naturalists, and others with an interest in our society activities. Please help us with this important activity.

C. Barry Knisley.

3. Report of the Secretary/Treasurer

The second annual business meeting of the Virginia Natural History Society as a section of the Virginia Academy of Science was attended by at least 24 members (counts were made during the day of paper presentations; a high of 30 was recorded for the afternoon session). Membership was the main topic of discussion, as was a continuing call for papers for **Banisteria**. The group agreed that the spring issue should be sent to members with a reminder notice to pay annual dues. If dues are not remitted by the fall, then the fall issue of the journal be mailed only to those who have paid.

The balance on hand at the May meeting was reported as $3,777.26. As of September 1995, the balance on hand was $3,938.34. As much as $1000.00 will be needed for the publication of **Banisteria** number 6 and for mailing this issue to members who are up to date with their dues. The financial records of the society will be audited by the end of the year as required by the VNHS constitution. Total membership as of October 1995 was 160, including 17 institutional members.

Anne C. Lund.

4. Report of the Editors

Banisteria number 5 was published on 28 April 1995. We have been fortunate to receive adequate numbers of manuscripts to fill recent issues without the co-editors resorting to writing papers themselves to take up the slack. However, manuscripts do seem to appear just in time for editing and publication. We have no backlog and thus authors experience a short time from submission to publication. We would prefer to have manuscripts submitted several months in advance of our publication dates (April and October) so that we will no longer experience the anxiety associated with the publication deadline.

Issue number 5 was again a unique combination of papers focused on a wide variety of natural history topics.

We were especially pleased with the historical papers by David Johnston and Keith Frye. We would like more historically-oriented papers for future issues. We have also received book reviews and news items of interest to our members. A topic less well represented, but which was foremost in our minds when we created **Banisteria**, is biodiversity inventories. We know some of you have conducted faunal inventories of selected areas for your own research and for government agencies and private corporations. Some of this information resides untouched in files and others in unpublished reports. This is the kind of information that should be published so that we can assemble a baseline of knowledge about Virginia's biodiversity. We are especially interested in receiving manuscripts based on surveys of defined areas.

We enjoy working with our colleagues and their manuscripts. We encourage more members to participate in the official publication of the Virginia Natural History Society. We think **Banisteria** is being well received and that it continues to fill a heretofore empty niche. We hope that members will spread the word around, especially to institutional libraries. This is a quality but inexpensive publication of interest to many people in Virginia.

Joseph C. Mitchell and Richard L. Hoffman.

Announcements

1. Forthcoming Meetings

Association of Southeastern Biologists - 10-13 April 1996, Georgia Southern College, Statesboro, GA. Contact Beverly Collins, Savannah River Ecology Lab, Aiken, SC 29802.

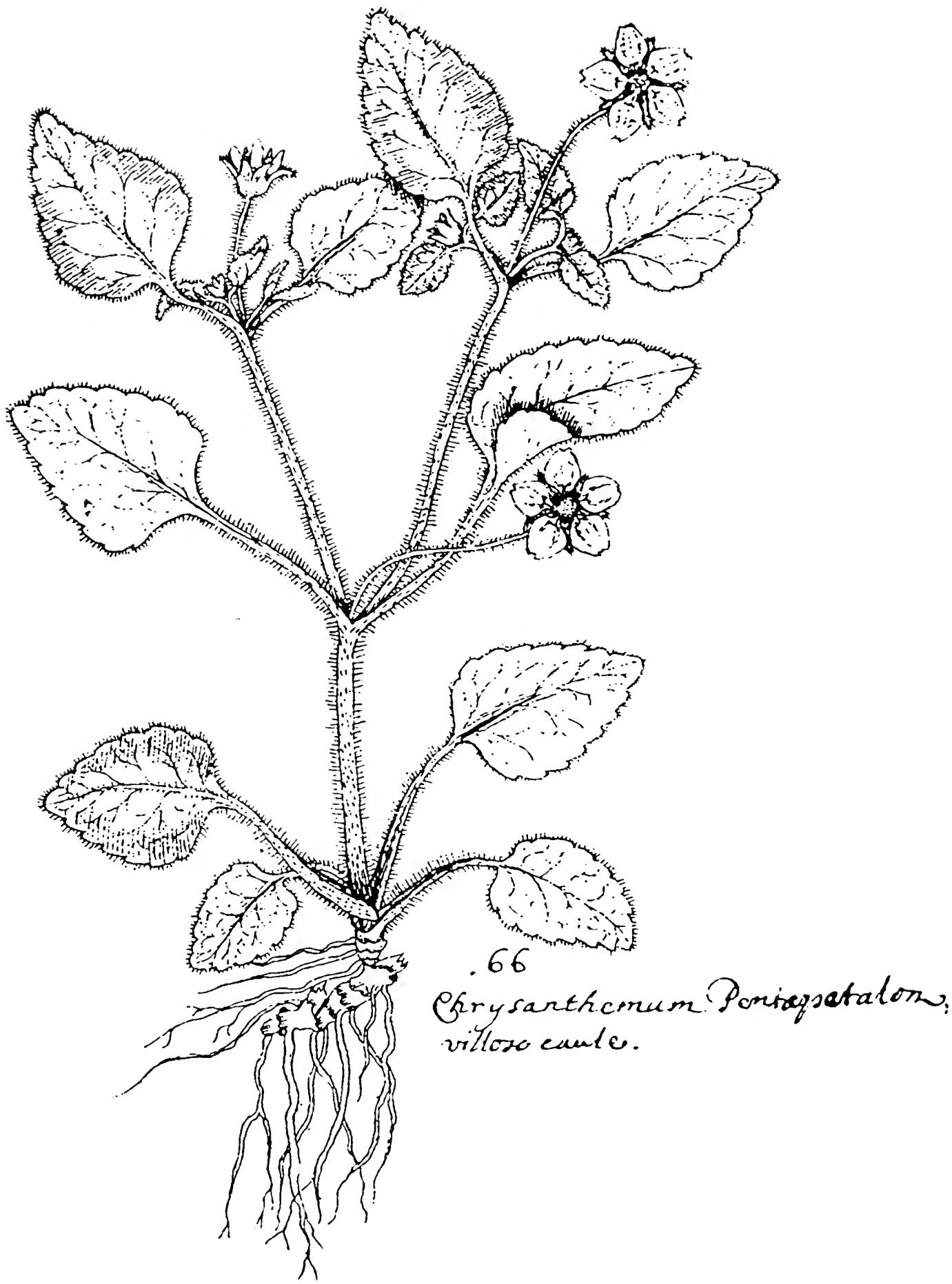
VNHS - May 1996 (no specific date set), Virginia Commonwealth University, Richmond, VA, with the Virginia Academy of Science.

2. The Center for Appalachian Trail Studies is organizing a wildflower survey to be conducted along the entire length of the Appalachian Trail. The survey will obtain distribution and flowering phenology data for all flowering plants. Future field guides are planned. The Center is interested in networking with individuals, universities, hiking clubs, and others who may want to help design and participate in this project. Information on this survey may be obtained from the Center for Appalachian Trail Studies, Hot Springs, NC (704-622-7601).

3. **Banisteria** is expanding the range of articles contained in its pages. The editors are especially seeking manuscripts on the biographies of people who have contributed to the natural history of Virginia. These articles could be exhaustive descriptions of the person's life and accomplishments, his or her contributions to the natural history of the Commonwealth, or a review of a particular phase in his or her life. Photographs and lists of publications are welcomed. There are few places where historical information about our colleagues is published and thus we envision that **Banisteria** could fill a long-standing void.

In addition, we are seeking book reviews from anyone who wishes to describe and critique books related in some way to the natural history of Virginia. We are also seeking essays on current issues or subjects pertaining to natural history. Essays can be of any length. The editors reserve the right to seek additional essays on the topic in question so that more than one view can be published. Letters to the editor are also welcomed.

Biographies, book reviews, essays, information on upcoming meetings, and letters to the editor should be sent to Joseph C. Mitchell, Department of Biology, University of Richmond, Richmond, VA 23173. Manuscripts of any length may be sent to either of the two co-editors.



Chrysogonum virginianum Linnaeus

Original drawing by John Banister. Figure 83 in folio in Hans Sloane's MS 4002 in the British Museum. Photocopy courtesy of Joseph and Nesta Ewan.